The City of Wings

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THE
CITY of WINGS

EUGENE P. LYLE III

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To the Engineer

DONALD A. HALL

who designed the *Spirit of St. Louis*
and thus became a member of the
partnership "We"

Printed in the United States of America

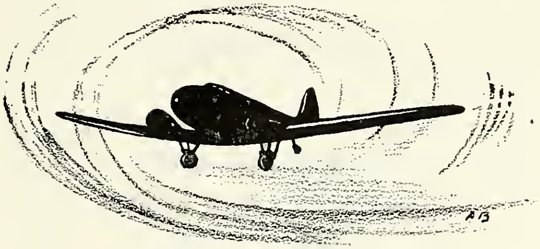
THE CITY OF WINGS

A narrative of aviation and its swift development as seen in San Diego from the earliest days of flying to the present time

●

Written by Eugene P. Lyle III
In collaboration with
Charles W. Diffin

Illustrated by
Aloys Bohnen, George E. Rhone
and Mary Belle Williams



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AND PRESENTED TO THE SAN DIEGO
CITY SCHOOLS
By the Board of Education of which
Jacob Weinberger is President

AND OF WHICH

Mrs. Vesta C. Muehleisen
Mrs. Mildred L. Hale
Orton E. Darnall, and
Dr. Edward L. Hardy
are members
and
By Will C. Crawford, Superintendent of Schools

FOREWORD

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Since the earliest days of flying, San Diego has been fortunate in its intimate association with aviation. Because of generally good flying conditions, the city has been selected for military and naval aeronautical work as well as for civilian and commercial flying. Historically, therefore, San Diego ranks high in any chronology of aeronautical achievement, as the following list of aviation "firsts" demonstrates. The list is compiled chiefly from a tabulation furnished by the Harbor Department of the City of San Diego.

1. First seaplane flight in the world, by Glenn Curtiss, in 1911
2. First shore-to-ship seaplane operation, plane hoisted to deck of U. S. S. Pennsylvania, Glenn Curtiss, in 1911
3. First amphibian flight, by Glenn Curtiss, in 1911
4. First aerial photographs, by Col. H. A. Erickson, in 1911
5. First radio used in an airplane, by Curtiss and Morin, in 1912
6. First official parachute jump, by Tiny Broadwick, in 1912, at North Island
7. First "loop-the-loop," by Lincoln Beachey, in 1913
8. First night flying, by Major T. C. Macaulay, in 1913
9. First U. S. Army aero squadron organized in 1914, at Rockwell Field
10. First aerial bombing, by Riley T. Scott, in 1914
11. First use of planes to locate schools of fish, in 1914
12. First transcontinental squadron flight, in 1918
13. First mass flight in the United States of over 200 planes, peace celebration, in 1918
14. First refueling in flight, by Smith and Richter, in 1923
15. First east-to-west, nonstop transcontinental flight, by Macready and Kelly, in 1923
16. First regular passenger service, San Diego to Los Angeles, in 1925, by Ryan Airlines
17. First circumnavigation of the world by air, in 1924, started and ended at Rockwell Field, San Diego. Flight was made by U. S. Army Air Corps, using Douglas planes.
18. First city on the Pacific Coast to draft an air ordinance, in 1926

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19. First municipal board of air control in the United States, in 1926
20. First flight of Lindbergh's plane, **Spirit of St. Louis**, by Charles Lindbergh, in 1927
21. First nonstop flight from San Diego to Mexico City, by Capt. Emilio Carranza of the Mexican Army, May 23, 1928
22. First night refueling in mid-air, by **Question Mark**, December 30, 1928
23. First transcontinental glider flight, started at Lindbergh Field, San Diego, by Frank Hawks

San Diego has been the scene of more than forty-two world's records in aviation. These records include altitude, distance, duration, and speed flights made by Army and Navy aviators since 1916.

With such a history it would seem unlikely that the city's connection with this great development should be forgotten. Yet events have a way of fading, and facts may become dwarfed by a perspective of even a few years. To insure to the pupils of San Diego's schools a continuing awareness of these facts, this book has been written.

Actual happenings are here presented against the San Diego background as it was and as it is today, written in a form designed to interest pupils and older readers alike. At the same time the narrative has been made factually correct by consultation with recognized aeronautical authorities, who have verified both illustrations and text. To Major Macaulay, Chairman of the Committee on Aviation of the San Diego Chamber of Commerce, to Howard E. Morin, Publicity Director of the San Diego Chamber of Commerce, and to Donald A. Hall, designer of the **Spirit of St. Louis**, our debt is here acknowledged for their courtesy and helpfulness in this regard.

JAY D. CONNER
Assistant Superintendent of Schools

WILL C. CRAWFORD
Superintendent of Schools

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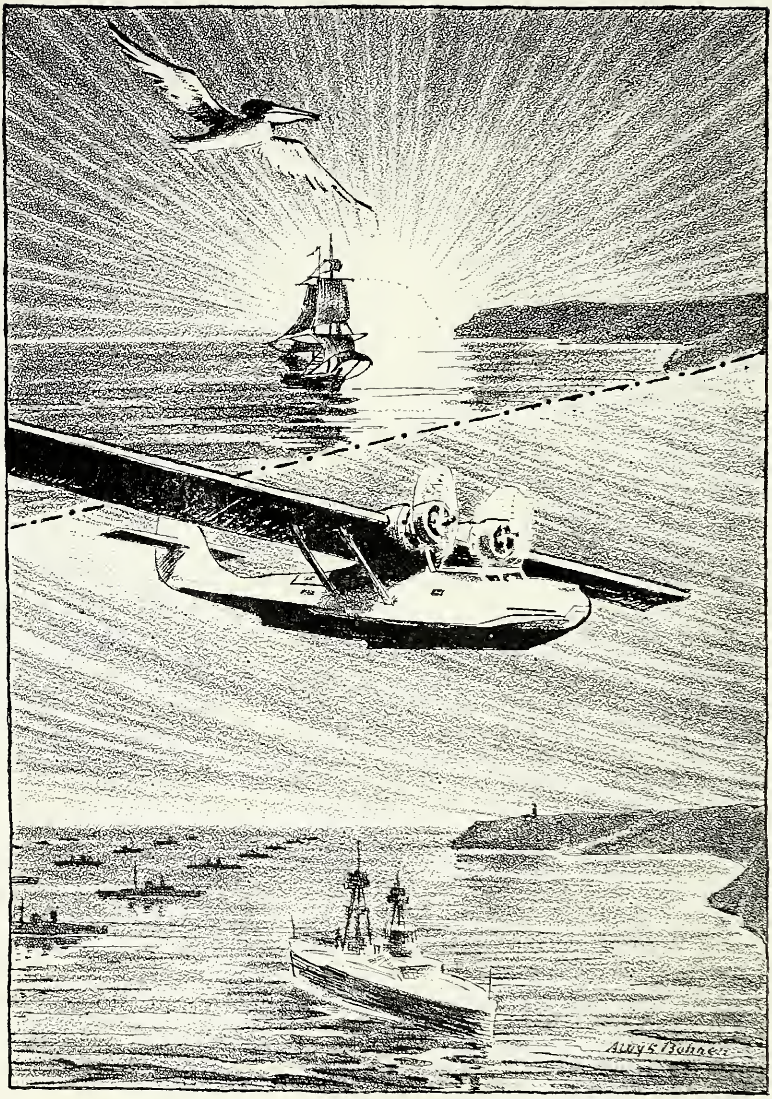


Wings over San Diego
1542-1938

Chapter One

DRIFTING STARS

IT is night in San Diego. Stars shine steadily against the sky, but among them is one light that moves. High in the air, it floats like a white star gone adrift. Others follow and make a group of white lights like a huge "V" and there is sound that comes faintly, a soft rumbling in the air. 62

The sound increases as the lights draw near. It becomes a droning like a swarm of giant bees. This grows to a roar, as red and green lights come into view among the white. 34

More lights come, more big "V's" of drifting stars. They pass overhead, and the air quivers with the beat of propellers and the thunder of motors. Squadron by squadron they come, until people watching from the streets lose count of the number of planes. They are watching a sight seldom seen elsewhere, yet a common one in San Diego's skies. It is a massed flight of naval aircraft above the City of Wings.

In the long line of squadrons is one airplane that flies alone. It is a patrol boat, a PBY-1, and there is no other like it in the air. In the forward observer's cockpit, well out in front of the wings, a young enlisted man is seated. His rating is aviation mechanic. He has come here from the East, and he is seeing San Diego and a great flight like this for the first time.

His ship is out over the bay. Ahead of him and following him are squadrons which have formed and are soaring on their way. Down below still other ships are taking off.

Airboats are rising from the water. Over on North Island, on the naval flying field, still other aircraft move and rise like great night hawks taking wing. These, being scout planes, come up fast. The young mechanic realizes their speed as he watches their lights come into formation. Others follow, strung out loosely one behind the other, but the stragglers roar ahead and take position. Then another "V" formation has sped out over the ocean into the night.

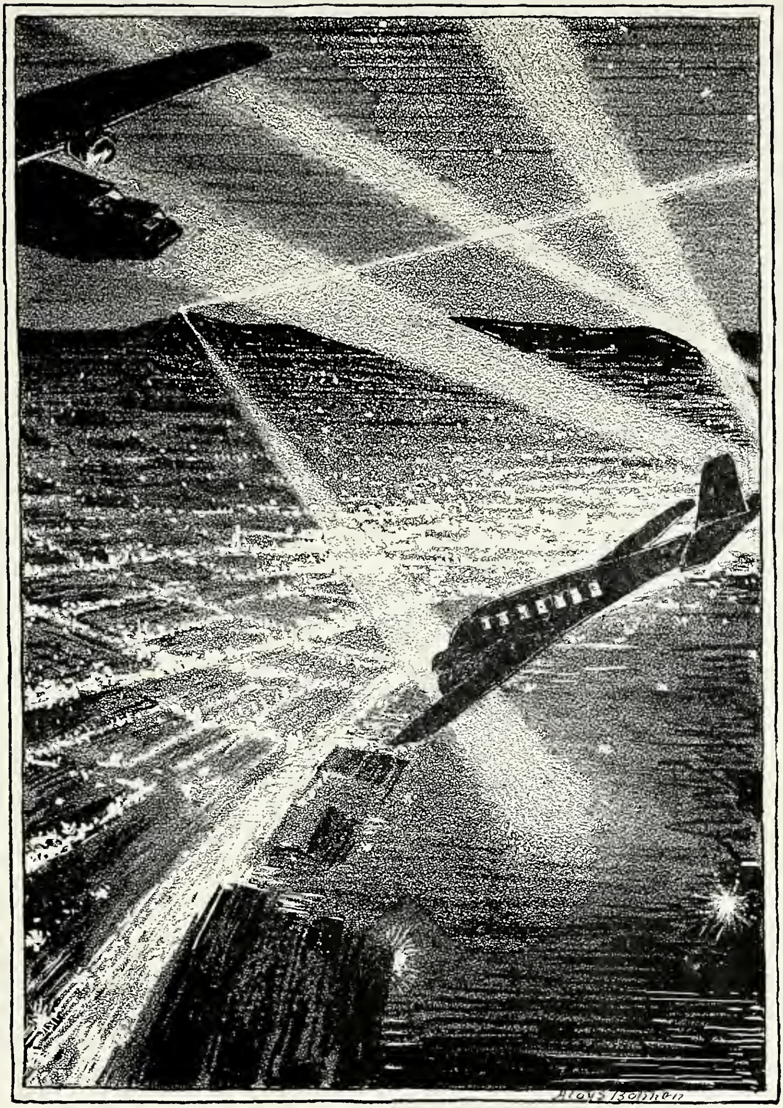
Out there beyond North Island, huge shadows lie on the water. The shadows are outlined in glittering light, and the young Navy man knows that these are warships anchored in Coronado Roads. He knows that the big airplane carriers, the *Ranger* and the *Lexington* and the *Saratoga,* are there, too. And, as his own ship, the PBY-1, swings nearer to the anchored fleet, he sees more airplanes rising, one after another, into the air.

Each carrier has nearly a hundred airplanes on its broad deck and hidden away inside the ship. Each ship is like a hornet's nest, sending its swarm into the air. These are swarms of landplanes that have gone to sea. They do not touch the water but take off in quick succession from the decks to roar skyward.

By now the big patrol boat has turned and headed back toward land, and the young mechanic sees San Diego, a criss-crossed pattern of lights spread across the ground. A broad gray expanse edged with lines of red light is Lindbergh Field. The buildings there are lighted, and suddenly a flood of white light pours across the field and makes it bright as day.

Below the patrol boat and off at one side, lights floating in the air have shown where another ship is flying. This newcomer passes between the patrol boat and the lighted field. A long fuselage and broad wings show black against the glare of the field. The plane slips past, then turns and glides gracefully down. It is a passenger ship, in from the north, and it has reached journey's end. On the brilliantly lighted field it comes to rest.

Strung out toward the north are the lights that have guided it, white signal lights, marking the airway along the coast. And off in another direction is another beacon light, used principally by Navy craft. This one throws one steady beam toward Lindbergh Field and the Navy flying field, while above it a second light flashes, goes out, and flashes again and again. It is the beacon



Night Flight

A passenger ship from the north

on Mount San Miguel. It is a lighthouse of the sky.

On Lindbergh Field the floodlights have gone out, but down there other lights and other buildings can be seen. One is a great aircraft factory building, the home of the company that made the PBY-1. They built it when the factory was in Buffalo, New York. Now the Buffalo factory has been abandoned. "Consolidated" has come to San Diego and has erected one of the largest airplane factories in the world.

The Ryan hangar is there at Lindbergh Field, too, and those of Airtech and the United Airlines and Western Air Express and the Coast Guard and the Army Reserve. Seeing all this and watching the big passenger ship come in, the young mechanic thinks of how a short time ago men only dreamed of things like this, of ships flying through the air on regular routes and landing at great air terminals. Now the dreams have come true. That airliner he just saw "come into port" makes its trip as regularly as a train. Its route, he knows, is marked not only by lights but by invisible radio beacons sent even through storm or fog from the radio range station with the lighted masts he can see below.

Abruptly these thoughts end. A louder roar from the two big wing motors back of him brings the young mechanic's attention sharply to his own ship and the other Navy planes. Off in the distance, the squadrons have wheeled into line and are driving straight toward those ships in Coronado Roads. The big patrol boat takes its place in the long line, and its engines sing their unbroken, humming song. Up ahead, the squadrons are diving toward one of the ships in the fleet. One by one the planes go down like falling stars. The patrol boat's turn comes next.

The big ship noses down. Roaring motors make still louder thunder. Air screams past. The patrol boat levels off and a moment later is flying close to one of the warships, where men stand at attention. There, the young mechanic knows, an admiral of the United States Navy is watching his eagles as they pass in review.

Formations break after that, and planes

head for "home." Some go to the North Island field, some to the broad, well-lighted decks of the airplane carriers. The PBY-1, again nosing down, glides this time toward the dark surface of the bay. Water splashes. Spray stings against the young mechanic's face. The big ship loses speed, settling lower in the water. Then motors renew their subdued thundering, and the PBY-1 taxis toward shore.

The mass flight is finished, the spectacle ended. Once more the sky is silent. Stars twinkle as before, but none moves now above the City of Wings.

Chapter Two

CURTISS DISCOVERS SAN DIEGO

NOT so long ago there was a time when only birds could fly. The only wings over San Diego then were the wings of gulls and pelicans that soared in the air currents above the cliffs and ocean waves. Those birds enjoyed San Diego's good flying weather, but no one else did, for no one else had ever flown here.

It was in January, 1910, that San Diego saw its first airplane flight, and birds learned that there were wings larger and stronger than their own. The gulls and pelicans must have been startled at sight of that "flying machine" and the "bird-man" who flew it.

People were not only startled but amused. Almost no one had seen an airplane, except in pictures, and only a few took flying seriously. It was a "stunt." It was like something in a circus, like a man risking his life on the flying trapeze, like some one going up in a balloon and trusting his life to a flimsy parachute. Still, thousands of people went to Coronado when the first airplane came.

A Curtiss machine, it was announced, would be exhibited at the Coronado polo grounds. When the day came, a great crowd pressed against the ropes that held them back from a "queer-looking contraption."

Its framework was of bamboo. The wings, made of silk, were fastened and braced with piano wire. There was no body, or fuselage, and the seat where the "aeronaut" would sit was on the lower wing, with the engine directly behind him. The machine rested on a pair of small wheels, with a third wheel out in front. It had been flown at Los Angeles in one of the first airplane meets of the country and had been shipped to Coronado for a three-day exhibition. Here was a "queer-looking contraption," beyond any doubt. All must have agreed that whoever sat in that seat and took the machine off the ground would be risking his life.

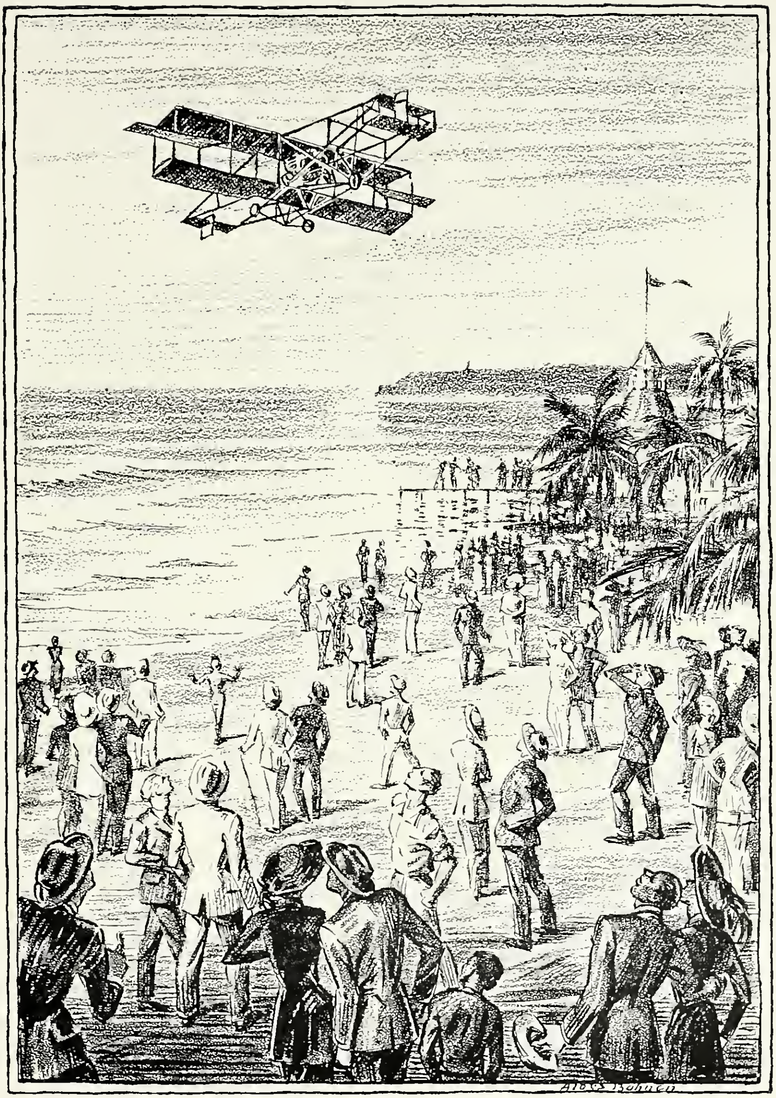
The man who was to fly it stood beside the machine, a sunburned fellow named Charles K. Hamilton. He waited while an announcer made a "spiel."

"This daring aeronaut is about to defy gravity," the announcer shouted through a megaphone. "Over the heads of the crowd this man will flirt with death in a spectacular exhibition of nerve and skill."

The "aeronaut" climbed into the seat on the flimsy lower wing, put his cap on backwards, so that it would not be blown off, and pulled a pair of huge goggles over his eyes. His hands were on the steering wheel directly in front.

Someone cranked the engine. It popped and coughed and sputtered, but finally it caught on all four cylinders. The propeller whirled and kicked up dust from the ground, and the crowd behind the machine scattered and ran for safety.

Suddenly the machine was in motion. With each wire and bamboo stick quivering,



San Diego's First Airplane
Noisily it climbed, higher than a tree

it lurched forward. Men ran alongside, holding to the wing tips, steadying them, until the propeller became only a blur and the machine quickly ran ahead of the men.

Over at the ropes, other observers crouched low trying to see underneath the machine as it went scuttling across the ground. If they could see beneath it, if the machine could rise ever so little, they would know it was flying. For a moment they stared. Then gasps of amazement came from all the crowd. The machine was in the air.

It rose to about the height of a man's knees at first. With a few feet more between its wheels and the ground, it managed to skim over a fence at the edge of the grounds. Noisily it climbed, higher than a tree, then higher than any building in Coronado, except perhaps the Coronado Hotel. Finally it was gone, flying straight away.

Horses tied to a hitching rail were now rearing and snorting. Chickens had run for shelter. The crowd, almost unbelieving, stared off into the distance, where the machine, after holding a straight course, dipped and turned in a wide sweeping curve.

It came back and circled the field. It was flying only forty miles an hour, but it was flying. At last it glided down, touched its wheels to the turf, and rolled to a stop. Flying, actual flying, had come to San Diego.

Not that this was the first machine to fly, for the first successful machine had been flown in the East by the Wright brothers about six years before. And even before that first flight, another pioneer, Professor Langley, back in Washington, D. C., had experimented with a man-carrying machine. Charles Manly, who later in war times was the head of the great Curtiss Plant at Buffalo, had designed the engine, and Manly tried to fly the plane.

They called it an "aerodrome," for the word airplane had not yet been invented, and they launched it from a boat on the Potomac River. It promptly smashed because of the poor launching device.

A second attempt was no more successful. This time the aerodrome was damaged by the crew of a tugboat as they hauled it from the water. Congress refused to grant money for further experiments. Some three years later the old scientist Langley died, his death hastened, no doubt, by the torrent of ridicule that was poured upon him. Not until much later was Langley known for the great man that he really was. Years afterwards a young man named Curtiss was to rebuild Langley's old machine and prove that it could fly.

While Langley's experiments were going on, two other men were at work. In a little shop at Dayton, Ohio, the Wright brothers were experimenting. At last, on a raw, blustery morning, December 7, 1903, at Kittyhawk, North Carolina, they did what no man ever before had done. They successfully flew and landed a heavier-than-air machine.

Now men knew it could be done. Six years must pass, though, before San Diego could take its part in the development of aviation. The beginning was that first exhibition flight at Coronado.

Just before that flight, an exhibition was held in Los Angeles. Wright planes were flown there, and planes built under Wright patents were brought from abroad. A Frenchman, Louis Paulhan, flying at Los Angeles, set a new world altitude record of 4,165 feet, which seemed a tremendous height at that time. But more important than any record was the fact that an American, Glenn Curtiss, came to the exhibition at Los Angeles with planes of his own. Shortly afterwards he "discovered" San Diego.

Curtiss had been building planes in a small factory on Lake Keuka, at Hammondsport, New York, and he had been having a great deal of trouble with the Wrights. The Wright brothers had patented certain principles used in their machines, one of the most important being their method of keeping the airplane balanced while in flight. They did this by warping or twisting the wings, and their patents prevented anyone else from building airplanes and flying them for pay if the planes worked in this manner. Glenn Curtiss found a way out of this difficulty. He made use of a better way of controlling the plane.

The Wright wings had to be light and flexible, in order that they might be twisted, or warped. Curtiss used solid, substantial construction in his wings, and he built in a movable part that had the same effect as twisting the wings. Ailerons, these movable parts were called, and they are used in all airplanes today. Curtiss was sued by the Wrights and had much trouble before he won the right to use ailerons.

This young man, Curtiss, came to San Diego from Los Angeles. He came searching for something, and he knew just what he was looking for. He wanted a place free from storms, a place with plenty of sunshine. He wanted a big level space for a landing field, and he wanted a body of quiet water, too.

All these things he found in San Diego, and it was not long before Curtiss had been given the use of North Island and had established a school for fliers. Here was one of the first flying schools in the world, in a time when even the best fliers knew almost nothing about flying. San Diego's importance in aviation began with that North Island school.

Curtiss did more than conduct a school.

He was experimenting. He believed that it might be possible to build an airplane that could rise from the water and come down on it. He even believed he could make one to use on both water and land.

Curtiss and his men built floats, or pontoons, and put them under a plane, only to find that the plane tried to dive nose first into the water. They tried all manner of ways, even dragging their pontoons by hand through the water, testing them, experimenting, trying to learn how to shape and balance them.

On the 26th of January, 1911, Curtiss took his machine out on the waters of Spanish Bight. The plane had a single float under it, and this had been adjusted and readjusted, as had every part of the machine. Curtiss had no real intention of attempting a flight at this time, although afterwards he said that when he climbed into the cockpit he felt a conviction that the plane could fly. No man had ever taken an airplane off the water and landed again without wrecking the machine, but he was sure the time had come. A student flier

Hydro-aeroplane, 1911

Curtiss flew for perhaps a half mile

spun the propeller, and Curtiss headed the machine into the wind.

It ploughed deeply into the water at first, then rode more lightly, till at last it was skimming the surface. Curtiss, who had been watching only the ship and the float and the water, suddenly found that he was driving straight for land. To go ahead meant a crash. There was no room to turn. Abruptly, he pulled back on the controls, and the plane, like a frightened gull, lifted off the water and seemed almost to leap into the air.

It did not fall back, but held its slight altitude and even climbed a little. Curtiss flew for perhaps a half mile. He then turned and headed back. The water was beneath him. He dropped the ship gently, and an instant later it was again bounding over the small waves of Spanish Bight.

He went up again almost at once. This time there were more than his own men on shore to watch him. The naval repair ship *Iris* sighted him as he flew past, and its siren screamed a greeting. Whistles on other vessels were opened wide, and soon it seemed that all the whistles on the bay and in the city were saluting Curtiss' achievement. Something great had been done, something of really tremendous importance in aviation. A "hydro-aeroplane," as they called it, had risen from the water and had landed again, the first flight of the kind in history.

In his school Curtiss was training Army and Navy officers and civilians. He wanted to convince both the Army and Navy that hydro-aeroplanes could be of use. So he trained the government's men without charge, and the Curtiss school on North Island became the birthplace of naval aviation.

Curtiss did more. He flew his plane every day and taught the students how to fly it. On February 17, he sent word to the captain of the cruiser *Pennsylvania* that he would fly over and be hoisted on board the warship any time they wished. The reply came promptly, "Come on over," and Curtiss took off.

Some time before this, on San Francisco Bay, Eugene Ely, one of Curtiss' students, had landed a plane on the deck of this same cruiser. Captain Pond of the *Pennsylvania,* who had given Ely every assistance, was just as ready to help Curtiss. In only a matter of minutes Captain Pond saw Curtiss land alongside.

The plane was hoisted aboard. Ten minutes later the engine was started, and the plane, lowered again to the water, began the return flight. It got back safely, and another "first" had been added to San Diego's record. For the first time it had been proved that airplanes could be used on water and could be operated in connection with a "mother ship." Military and naval aviation and flying of other kinds, as well, were ready to begin.

Chapter Three

SCHOOL DAYS

HERE is a bulletin issued at the Curtiss Aviation School on North Island: "The course is divided into six parts or stages.

1st. Ground work with reduced power, to teach running in straight line.
2nd. Straightaway flights near ground, just sufficient power to get off.
3rd. Straightaway flights off the ground at a distance of ten or fifteen feet, to teach the use of rudder and ailerons.
4th. Right and left half circles and glides.
5th. Circles.
6th. Figure eights, altitude flights and landing without power, and glides."

Instructors and students hurried out to the field at daybreak to fly before the least breath of wind came up. The first to arrive had the first chance at "Lizzy."

Lizzy was the practice airplane, but Lizzy could not fly. The pitch of the propeller had been changed, so that it could not pull the plane off the ground, or at most would lift it only a few inches. But Lizzy would go roaring over the ground and give the students the first of the instructions the bulletin called for.

Students of many nationalities were there. One, a young man whose application came from Alaska and whose name was T. C. Macaulay, was among the first. Macaulay still lives here in San Diego. Bert Acosta, later one of the leading pilots for a much greater Curtiss Airplane Company, was a mechanic at North Island.

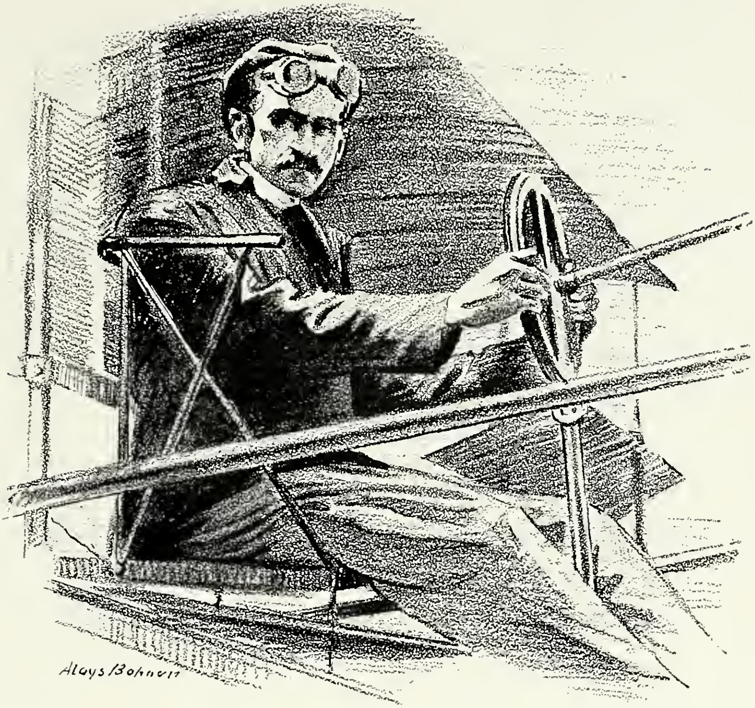
There was an Austrian nobleman, too, named Haldeman von Figglemessy; and Nakamura, a Japanese; and Mrs. Lilian Atwater, of New York, whose idea of real sport was to try to catch pelicans in a net while both she and the pelicans were flying through the air.

Finally, there was Tom Gunn, a Chinese.

Tom Gunn was always an optimist, and always cheerful, but he had hard work learning to fly. Airplane after airplane was wrecked, but still Tom Gunn failed to "get the hang of it." At last, though, he got so he could chase jackrabbits through the chaparral with his plane. He wrecked one last machine, to his great distress, for this plane had wings of glistening white Chinese silk. He tangled it in a telephone line, but he jumped to safety. Later he was heard of in China where he was actually flying.

It was said that they taught flying at North Island in all languages, including the sign language. The joke shows something of what those days were like.

Many fine pilots were being developed. Among them was Lincoln Beachey, one of the most daring stunt fliers of that time when stunt flying was of peculiar importance. Not much was being done in military or naval aviation. Both Army and Navy were slow to believe that these new "flying machines" would be of any great value to them. Civilian stunt fliers like Beachey, though, found immediate use for planes.



Glenn Curtiss
Taught flying in all languages

These fliers went all over the country. From North Island and from Curtiss' other school at Hammondsport, New York, these daredevils flew their rickety planes and gave exhibitions wherever people would pay to see them.

Curtiss was opposed to stunt flying. He was more interested in developing safe planes and proving their worth for Army and Navy use. Curtiss, however, allowed Beachey to attempt one stunt, the famous loop-the-loop.

Beachey did it at North Island. From only a short distance in the air he aimed his plane straight down and plunged toward the ground to what seemed certain death. Just short of crashing, he pulled out of the dive, and the plane shot up. Still curving, it went over backward and completed the loop.

It was the first time in the United States that a plane had been looped, and Beachey's fame was secure. After that, he went on to more spectacular stunts. He looped time after time, making many loops in succession. He gave exhibitions all over the country. He even flew under the steel arch bridge below Niagara Falls, where treacherous air currents pulled and tugged at his little plane and tried to draw it down into the gorge. His career ended over San Francisco Bay, when the right wing of his monoplane crumpled. Like many other stunt fliers of that time, he had tempted his luck too far.

While stunt exhibitions of this sort were going on, Curtiss was working along more practical lines. Back in 1911, only a few weeks after he had made his flight to the cruiser *Pennsylvania,* another of his dreams came true.

He had believed that a plane could be made to light on either land or water. Such a plane would have many uses, he knew. So he attached a pontoon beneath a plane and also built in a wheel landing gear that could be raised or lowered.

On Sunday, February 26, 1911, Curtiss took off from the waters of Spanish Bight. He flew over the ocean and down the beach toward Hotel del Coronado. Lowering the wheels, he landed on the smooth sand, only to take off again a short time later and return to his starting point. There he came down on the water of Spanish Bight. Another "first" in aviation had been added to the history of San Diego. The first amphibian had proved that a plane need not be held to water or land alone.

One more thing remained for Curtiss to accomplish before he could feel that he had proved the usefulness of planes for both Army and Navy. His hydro-aeroplane had been lowered to the water from the deck of the *Pennsylvania* and had flown away, but Curtiss wanted more. He wanted to launch a plane from the deck of a ship without its touching water, or at least to prove that it could be done. Lieutenant Ellyson, while studying under Curtiss at North Island, had worked out a plan for an airplane-launching device. At the Hammondsport factory, in that same year of 1911, the experiment was made.

A sloping cable was rigged above the water, and a groove was made in the bottom of the airplane's float. The cable fitted in this groove. Ellyson's idea was that the plane would slide down this cable in about the same way that a circus performer slides down a slanting rope while standing on his head.

It worked. The plane went down the cable. It picked up speed. Before it touched the water, it rose into the air and was off. Curtiss had transformed another "wild idea" into an actual fact.

The fact that planes could be launched in a similar manner from a ship was evident to all. Today, planes are launched from battleships and cruisers by a catapult instead of a circus stunt on a sloping tight rope, but Curtiss and Lieutenant Ellyson must be given credit for showing the way and proving that it could be done.

Neither Army nor Navy was immediately converted. Both were slow to believe that the airplane would be of service in war. Regiments of men on land and floating steel fortresses on water were what battles were fought with. So for a few years, stunt fliers, in their exhibitions of "death-defying daring," were the chief users of the plane.

By 1915 two great expositions were under way on the Pacific coast. One was at San Francisco. The other was in San Diego.

Both, of course, must have airplane exhibitions.

At San Francisco, Lincoln Beachey was the official aviator, until that day when his monoplane crashed into the bay. Later "Bird Boy" Art Smith took up his work. In 1916, the second year of the San Diego Exposition, arrangements were made for exhibition flights over the fair grounds in Balboa Park.

By that time Curtiss had left North Island. His own exhibition company had been disbanded. The same thing had happened to the "flying circuses," operated by the Wright brothers. Exhibitors were sickened at seeing their pilots meet death in the performance of their stunts, and Curtiss, now operating other factories, was manufacturing planes for Europe.

Flying continued at North Island, even though Curtiss was gone. The Army had at last begun the development of an aeronautical branch of the service. Rockwell Field had been established at North Island, and important visitors to the San Diego Exposition were sometimes given flights in military planes. At the foot of Market Street, a flier, Ovar Myerhofer, was operating a flying boat and taking up passengers for short flights. One of his stunts was to fly Louis Almgren, Chief of the San Diego Fire Department, calling his plane "The First Aerial Fire Engine."

That was all that San Diego could offer, all the flying that could be seen here. Something more was needed to meet competition. So G. Aubrey Davidson, president of the San Diego Exposition, engaged a flier named Joe Bocquel to make ten exhibition flights over the fairgrounds in Balboa Park.

Bocquel came here with his plane. Davidson, a business man, insisted that Bocquel sign a paper releasing the exposition from all liability for damages. Bocquel stunted thrillingly. His first performance showed the plane in a "falling leaf" maneuver, then in spirals and dizzy swoops. Another "falling leaf" performance ended in a dive directly over the heads of the watching crowd. This was too much, and Bocquel was told to do his stunts over the canyon where Cabrillo Bridge stands.

All went well until the tenth exhibition. This time Bocquel showed all the tricks he knew. There were the "falling leaf" and "power dives," until at last he dived down into the canyon, rose again, and went into a tight spin. The crowd thought it was a new kind of stunt, perhaps another "falling leaf" trick. But the spin continued, and Bocquel crashed where death waited for him in the shrubbery-covered grounds where the Zoological Gardens are now.

The tragedy marked the end of stunt flying at the exposition. It marked the end of the whole period of trick flying, too. For by now the great World War had gone into its second year, and other uses were being found for planes.

Over the war-torn countries of France and Belgium, airplanes were in constant flight. They were being rapidly improved, and the time had come when flying must become something more than a circus performance. It was being developed for more deadly work, and again San Diego was to have a part.

Chapter Four

FLIERS FOR THE WAR

IN 1914 the World War began, and for the first time in the history of the world, airplanes were used in a great war. Three years later, in 1917, the United States was drawn into the struggle. San Diego soon became an important center of war-time aviation.

Not that San Diego had airplane factories. Neither engines nor planes were built here then. But San Diego had the sunshine and storm-free days that had attracted Glenn Curtiss, and the same conditions made the city an ideal place for training pilots.

Thousands of pilots were needed. In fact, the allies in Europe were so far ahead of this country in airplane manufacture that they expected little help from planes made in America. Their demand was for pilots, and San Diego prepared to do its part.

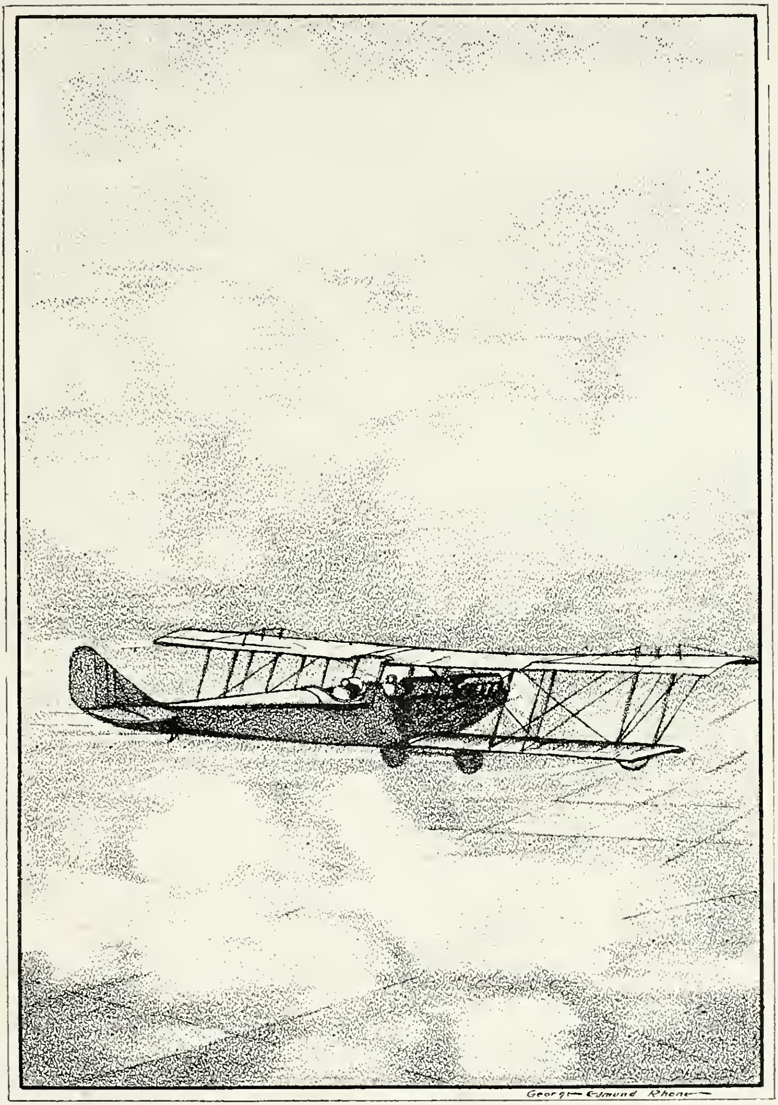
A training field was established at North Island. T. C. Macaulay, the young man who had come from Alaska to learn to fly at Glenn Gurtiss' school, was in charge. In fact, Macaulay, now a Major, was in command of all Army aviation in the San Diego district. For it was the Army, not the Navy, which made the greater progress in aviation during the period of the World War.

Major Macaulay developed Rockwell Field at North Island, and soon he was admitting one hundred cadets weekly for flight training. This meant that soon one thousand to twelve hundred cadets were being trained at one time at Rockwell Field, and more room was needed. East Field, named after Major East, an Army flier who had lost his life some time before, was established on Otay Mesa. In addition to these fields an advanced acrobatic training field was opened at Imperial Beach cavalry grounds. A gunnery flying school, known as Ream Field in honor of Major Ream, the first flight surgeon at North Island, was established nearby at Oneonta.

Then San Diego became a city of many wings indeed. Training planes, manufactured in eastern cities, were sent here in a steady stream. Each day saw more of them in the sky. Though the great World War was being waged thousands of miles away, here in quiet, sunshiny San Diego, preparations for the struggle were going ahead day and night.

For a year and a half the fighting in Europe continued. During that year and a half in San Diego not a day passed without airplanes in the air. With straight flying and acrobatics and gunnery practice, the five hundred Army planes sent here during the war were kept busy. But of private flying there was none. All private flying was forbidden. On the beach at North Island a seaplane was allowed to rot, because the owner was not permitted to fly it. So far as flying was concerned, the air was only for purposes of war.

During that year and a half San Diego became "air-minded," more so probably than



The "Jenny"
Curtiss JN4D training plane

any other city in the country. By the end of the war North Island had become a busy place. Hangars and machine shops and storage buildings had been erected. There were barracks and mess halls. On the sand flats, where a year and a half before had stood only a few sheds, were paved streets and busy, hurrying crowds of officers and men.

On November 11, 1918, the Armistice was signed, and the World War was at an end. A little over two weeks later, on November 27, two hundred and twelve planes took to the air above San Diego, in celebration of peace. This was the largest flight of airplanes that had ever been in the air at one time. San Diego, that day, set another aviation record.

Soon after the mass flight, the planes were grounded. The young fliers returned to their homes. Flying on a large scale seemed ended. Yet aviation had left an indelible stamp upon San Diego.

The whole business of aviation had changed, too. The Navy, although doing some experimental and developmental work, was still unconvinced that airplanes had any importance in naval warfare. The Army, however, had learned its lesson. Men of the Army knew that airplanes had become nearly as necessary as gunpowder, and that flying must go on.

Everything needed was at North Island. Flying fields and buildings of all kinds were ready for use. The year and a half of war had shown that San Diego was perhaps the best place in the country for aeronautics. Soon after the end of the war, the Navy moved in with the Army at North Island. Naval aviation did not assume immediate importance, but the Army at once began the tremendous development that would grow greater through the following years.

Chapter Five

PASSENGER CARRYING BEGINS

FOLLOWING the war, a new kind of flying developed. Scattered throughout the country were thousands of trained pilots. Some had barely completed their courses of instructions. Others were seasoned fliers. Nearly all were anxious to continue with flying.

Machines were here, as well as men. Airplanes of various kinds, engines, and repair parts lay in factories and at flying fields. Men and machines were soon brought together, and the result was the "barnstorming period" of flying, something which will never again be seen.

To own a plane and to wander about the country, stopping wherever a few dollars could be made by taking passengers for short joy-hops — that was barnstorming. Any young man who could fly and who could get together enough money for a plane could be a barnstormer. Some of their planes were good, some not so good. Most of them were old training planes, bought for about $2,000 each, but passengers were willing to take a chance.

Barnstormers were rovers, "gypsies" of a new sort. Many were daredevils. All, without knowing it, were missionaries, carrying the message of aviation to the people. Few people had ever been in an airplane, and customers were willing to pay from $2.50 to $15 for a five-minute ride in anything that could get off the ground. Many San Diegans had their first rides with fliers of this sort. In general, barnstorming was good "advertising" for aviation. Here, and all over the country as well, people were learning that airplanes could be used for something else than war.

Yet some of the stunt flying, such as the exhibitions by Clyde Pangborn on Coronado Strand, was not such good advertising. As a publicity stunt Pangborn announced that he would attempt to climb from a speeding automobile into an airplane, a trick which at that time had never been done. The announcement brought crowds from San Diego to watch him.

Down the sandy beach at sixty miles an hour roared the car carrying Pangborn. The windshield of the car had been removed. The driver, wearing goggles to protect his eyes, crouched low behind the steering wheel. Pangborn was in the rear of the car.

Behind him came the airplane, gaining on the car, overtaking it. Its pilot leaned over the side to watch Pangborn, who braced himself for the leap. Attached to the landing gear of the airplane was a rope ladder, weighted to keep it from flying back. It swung close, and suddenly Pangborn lurched forward.

He clutched at the dangling ladder, missed, and fell down into the back of the car. The car turned back for another trial.

Again it came down the beach with the airplane in pursuit, and again Pangborn missed. He tried several times until, on the last attempt, he was thrown from the car and sent in a tumbling, rolling heap along the beach.

Somehow he escaped death, although he was painfully injured and was rushed immediately to a hospital. Newspapers declared that he had risked not only his own life but the lives of spectators. They condemned all daredevil barnstormers, and for a few months San Diego was a poor place for any barnstorming aviator to look for customers.

All over the country, barnstorming went on. Pangborn recovered and went east to join the Gates Flying Circus, the most famous organization of its kind in the country. An "aerial circus" was usually composed of two or three barnstormers working together, but the Gates Circus had a dozen members. Pangborn became chief pilot.

In San Diego the feeling against barnstormers was only temporary. Soon after Pangborn left, others came, some of them to stay for a while. When a roving aviator decided to remain in one place, he lost his title of barnstormer and became known as a fixed-base operator. These fixed-base men, and their machines as well, were more reliable as a rule than the rovers. The barnstormers seldom found housing for their machines, which often became badly weathered, but the fixed-base operators usually owned hangars and employed mechanics to keep their machines in reasonably good condition.

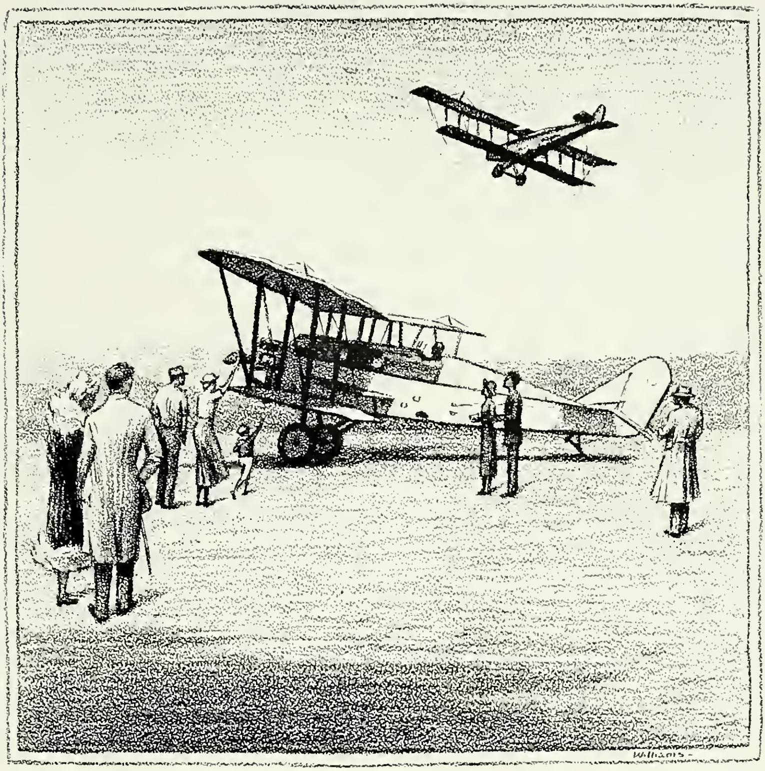
One of the first to become a fixed-base operator in San Diego was a man named Hennessey. He acquired an abandoned Army mess hall that had been part of Camp Taliafero, the 21st Infantry camp located just northwest of the Indian Village in Balboa Park during the war. Hennessey had to rip up the flooring of the old mess hall in order to get his airplane into it. The hangar he thus made was probably the first private hangar in San Diego.

T. Claude Ryan established a field near the foot of Broadway. Later he moved to the salt flats opposite the Marine Base and east of Point Loma Country Club. This was a good showman's location. Pleasure seekers driving to and from the beaches would see the airplanes and stop. Since the flats were reasonably level, not much work was required to clear them of what little brush grew there.

Ryan sold a half interest in his business to Benjamin Franklin Mahoney. When Mahoney had learned to fly, he and Ryan gave flight lessons and took up passengers. But more important things were to come, and soon through the efforts of Ryan and Mahoney another "first" was added to San Diego's record. Commercial aviation was stagnant. It was in the middle of a depression all its own. Many still believed that the only real use for airplanes was in war. Yet on March 1, 1925, passenger service began in San Diego.

The local Chamber of Commerce claims this was the first scheduled passenger service in the country. It operated between San Diego and Los Angeles, one hundred and twenty-one miles, and was known as Ryan Airlines. Here in San Diego in 1925 was a beginning of commercial aviation.

Fare to Los Angeles was $17.50, the round trip costing $26.50, including tax. The schedule was not always strictly kept.



Ryan Airlines
In 1925 passenger service began

Nevertheless, in 1925, Ryan Airlines carried 7,890 passengers. Ryan was one of the few barnstormers who developed into something bigger than a one-man, one-plane outfit.

By this time the barnstorming period had passed. Most of the old planes had found their way to the scrap heap. Hollywood motion picture producers were using planes for spectacular "shots," and many such scenes were filmed in San Diego. Hair-raising stunts, however, were reserved for the movies and no longer had a place in ordinary flying.

Aside from military and naval aviation, only Ryan Airlines carried on, operating from the "airport" on the salt flats. Their planes were small, their equipment none too adequate. They were, however, carrying passengers and leading the way for the passenger lines, which would later spread a network across the continent.

Chapter Six

MARKING TIME

BY 1922 and 1923 commercial aviation in the United States had come almost to a standstill. Government flying was increasing, with both Army and Navy steadily building up their air services. In commercial aviation, however, nothing was being done.

Even aviation enthusiasts were losing heart. They were sure that commercial flying was destined to grow into something great. But when? That was a question they could not answer.

Pioneer work must be done. In all the country there were only a few really good landing fields, and practically all of these were for Army and Navy use. More landing fields were needed. Air routes must be mapped. New types of passenger planes must be designed and built. All this, though, would cost money, and financiers were not ready to invest.

The United States, where flying had begun, was lagging behind European countries. In Europe, passenger lines were being established rapidly. The governments of France and Germany and England were encouraging commercial aviation by grants of money or by subsidies to private companies. Here nothing of the sort was being done.

It was a period of waiting, of "marking time" for all those interested in commercial flying. It was a time of discouragement, too. Unless something could be done to make people see the commercial possibilities, aviation might lag for years.

Time passed. A year, then another, and still others slipped by. During those years San Diego was one of the few bright spots on the aviation map. Because of military and naval flying at North Island, the city had become one of the foremost aviation centers in the country.

Under the direction of Major General

Mason M. Patrick, the Army's flying units had been taken from the Signal Corps, and the Air Corps had been formed. Aviation's importance to the Army was steadily being recognized. One of the Army's five Air Corps depots was maintained at Rockwell Field. This became a base for pursuit, observation, and bombing squadrons. It was these squadrons that kept the sound of motors and propellers in the air.

By this time the Navy, too, had been awakened to the importance of aircraft, although it was the Army that showed the way. General William Mitchell, Assistant Chief of the Air Corps, arranged for bombing experiments, in which Army airplanes used surrendered German warships as targets. The ships were to be sunk anyway, and the Navy had war vessels of its own waiting to sink them with gunfire after the airplanes had had their sport. But when the airplanes were through bombing, the guns of the waiting ships were not needed. The German vessels were at the bottom of the sea, and men had learned that even warships could not treat aircraft with contempt.

In the next few years following 1922, while commercial aviation waited, the North Island Naval Air Base became the largest of five naval air stations. During that time San Diego saw new records made and old ones broken, but these were no mere daredevil stunts of Hollywood fliers. Army and Navy aviators now were showing what aircraft could do.

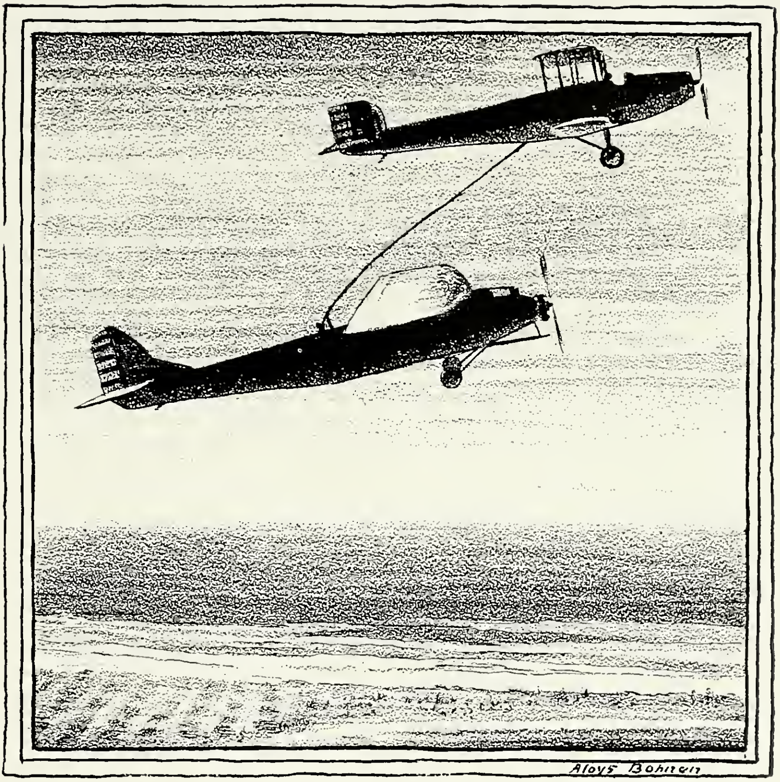
Lieutenant James Doolittle, probably as skillful a pilot as there was in the world, flew a Curtiss Navy Racer from Jacksonville to San Diego in twenty-two hours and thirty-five minutes. A stop of one hour and fifteen minutes was made at Kelly Field in Texas, but a new record was established. That was in 1922, and never before had the coast-to-coast trip been flown in less than a day.

Other new records followed fast. In October of that year Lieutenants Kelly and Macready took a Fokker T-2 up from Rockwell Field for an attempted flight to New York. Fog over Tejon Pass forced them to turn back. The New York flight was abandoned, but the two fliers decided to try for another record. Returning to Rockwell Field, they dropped a message by means of a small parachute. The message told of their plans. After that they flew above San Diego and North Island, hour after hour.

Thirty-four hours after they had taken off, they landed. They had kept a plane in continuous flight longer than had ever been done before. The record was not made official, however, since the necessary instruments had not been carried in the plane.

A few months later the same pilots were ready for another attempt at the New York flight. With the same Fokker as before, they took off for New York, only to be forced down at Indianapolis by a cracked cylinder. In May, 1923, they were successful, flying in the other direction. Leaving New York, they flew to San Diego, completing the first transcontinental nonstop flight.

Refueling an airplane in flight was something else which San Diego saw done for the first time. Above Rockwell Field, Captain Lowell Smith and Lieutenant J. B. Richter took a fresh supply of gasoline into



Refueling in Flight

San Diego saw it done for the first time

the tanks of their plane from another airplane flying above them.

In this time of rapid development, record after record was broken in various parts of the country, until by the end of 1923 the United States held thirty-three out of forty-two world airplane records. Twenty-two of these were held by Navy pilots, and eleven were established by the Army. In both services, Uncle Sam not only had grown wings but had proved beyond any doubt that he knew how to use them.

He was proving it by carrying mail, too. The first air-mail line was established in 1918 between Washington and New York. In the years that followed, this line was extended to Boston. Next the air mail headed west. Mail was flown to Cleveland, then on to Chicago. Rebuilt Army planes were used, and, although flown only in the day time, they were proving something which many people had thought impossible. They were showing that airplanes could be flown over long distances on regular schedule and that airmail was fast and dependable. Airmail lines soon ran from coast to coast.

But this was all government flying. Commercial aviation in the United States still lagged though other countries went ahead.

The United States did not even have laws to regulate flying. Again San Diego took the lead under the guidance of an aviation committee that had been formed in the Chamber of Commerce. Major Macaulay was at the head of this committee. In 1926, as a result of the committee's work, the city council was persuaded to pass an ordinance creating a Municipal Board of Air Control, the first of its kind in the United States. This board made rules for flying above the city.

Nearly a year later the United States government did the same thing on a larger scale. The Bureau of Air Commerce was established, and Congress passed the Air Commerce Act, providing laws to regulate flying throughout the country. Never again could there be flying of the old barnstorming sort, for now pilots must be licensed and airplanes inspected.

Through all those long, discouraging years of waiting, the general public had seen what the air mail was doing, and was growing air-minded to some extent. Financiers were almost convinced that airplane manufacture and airlines would prove good investments.

Yet nothing happened. The United States was like a great stage upon which the scenery had been set. Performers were ready; the audience waited; but one big, spectacular act was needed to get the performance under way.

Then came 1927.

Ryan's partner, B. F. Mahoney, had bought Ryan out, although the company continued to be known as the Ryan Aircraft Company. Mahoney had taken over the flying field and the hangar of the company, and he had rented an abandoned fish-and-fruit cannery at the foot of Laurel Street for a factory. He had employed Donald A. Hall as chief engineer, putting Hall to work redesigning the Ryan M-2 monoplane. All this was part of the big act for which the stage in America was waiting.

A telegram was part of it, too—a message from the Robertson Aircraft Company, of St. Louis. It was addressed to Mahoney.

"Can you supply airplane equipped with Wright Whirlwind engine for nonstop flight New York to Paris?"

At last the stage was fully set. Mahoney and his little factory were ready. Donald Hall, the designer, was ready. And the whole world, although it did not know it, was ready and waiting. There came then, with startling swiftness, the most tremendous event in aviation since the day the Wrights first lifted their plane off the ground.

Chapter Seven

SAN DIEGO TO PARIS

ON the 25th of February, 1927, there came to San Diego a quiet, soft-spoken, unassuming young man of twenty-five. At the office of the Ryan Aircraft Company, he introduced himself. He was Charles Lindbergh, he said, and the Robertson Aircraft Company, of St. Louis, had wired about an airplane and received a favorable reply. He was here to see about it.

Both Mahoney and Bowlus, the factory manager, were away. The young man walked through the little factory. After a time the two returned where Lindbergh waited, and talked with him. Then Hall, the engineer, was called in. Right there an odd sort of "partnership" began. Lindbergh

City Schools Library
San Diego, Calif.

and Hall—Hall and Lindbergh. Both were needed in order that the great act might be put on, Hall to design the plane and Lindbergh to fly it.

Now, for the first time, it was learned that Lindbergh planned to fly alone. The announcement was startling, at first. As Lindbergh talked, the others began to share his own confidence in himself and to see the proposed flight as he saw it. It could be done, and he was the one to do it. To fly alone was the best and simplest way.

The engine had been decided upon previously. Lindbergh had already selected a Wright Whirlwind engine, model JFC, of two hundred and twenty horsepower. Now he and the others must decide upon a plane to carry pilot and engine and fuel enough for the long flight.

They went out into the factory and looked at the bare fuselage of a Ryan M-2 which was being built. It was Lindbergh's idea that a stock M-2 could be changed and made to do for the flight, but Hall was already figuring, working out the first of a thousand problems he would have to solve.

Charles A. Lindbergh
He believed he could fly alone

The distance between New York and Paris was taken to be three thousand six hundred miles. The Whirlwind engine, delivering enough power to fly the plane at ninety miles an hour, would use ten gallons of gasoline every hour. Three thousand six hundred, divided by ninety, meant that the flight would last forty hours. And this meant that four hundred gallons of gasoline would be needed for the trip.

The fuselage and wings of the M-2 could not hold tanks large enough for four hundred gallons. Lindbergh's suggestion was that an extra streamlined tank be suspended below the fuselage. Hall pointed out that this would cut down the speed, and the idea was abandoned. Then followed an evening which Hall spent examining the few existing drawings of the M-2.

He found little that was encouraging. The wings of the M-2 did not develop lift enough to carry that added load of over a ton of gasoline. Increasing the size of the wings would give more lift but would put added strain on other parts. The ship would not stand it. It would be a makeshift job at the very best. At length Hall reached a decision: a new airplane must be designed and built.

He gave this report to Lindbergh and Mahoney. Lindbergh was satisfied, but he pointed out that the ship must be ready for flight in sixty days. On the Atlantic coast others were preparing to make the same trip, and there was no time to waste. The Orteig prize of $25,000 would be paid to the first successful contestant. Sixty days was the limit.

Sixty days, and a ship to build, and then an ocean to fly. That was the situation to be faced. Either half of that tremendous undertaking seemed as impossible as the other, but Hall and Lindbergh went to work.

In a little room of the factory building Hall made his first sketches, covering papers with his figures and drawings. At another table, perched in an old pilot's seat, Lindbergh sat and studied his own problems of navigation. Presently drawings began to go from that little room out into the factory. Every man in the factory was ready to give his best of skill and workmanship. The building of the ship began.

It was known as the NYP, the initials being those of New York and Paris. When the plane was built and registered with the United States Department of Commerce, it became the N-X-211, but it went through the factory as the NYP.

Hall worked night and day, figuring weights and loadings and strength of materials, and designing a ship that would leave no questions unanswered. Not that he made a complete new design of the whole airplane; there was no time for that. Neither was there need. Hall was familiar with many other models. He had done experimental work previously with transoceanic flights in mind. Now it was his job to bring together all the available parts which would go to make a complete and perfect plane for this job. A Fokker-designed landing gear was used, and Hall found that the M-2 tail assembly was suited to this new ship.

So it went. He designed new parts where necessary, and made innumerable decisions as to what could or could not be used. The responsibility during all that short but action-crammed period of building was his.

Lindbergh weighed one hundred and sixty-five pounds, and Hall took that into consideration. Another factor was fuel load. The weight of the gasoline was increased, with four hundred and fifty gallons instead of just the bare four hundred taken to provide an allowance for safety.

The distance between New York and Paris was checked. Down at the public library Hall and Lindbergh could have been found one day measuring that distance on a world globe. They measured with a piece of string and arrived at the figure of three thousand six hundred miles. That distance has since been accurately measured at three thousand six hundred and ten miles, a low percentage of error to be charged against those two young men with a piece of string.

At last the ship was done.

In the factory hundreds upon hundreds of wood and metal parts had been made and fitted, then glued or welded with the greatest care. Every ounce of weight that could be taken off safely had been eliminated. The

Lindbergh and Hall
Then measured with a piece of string

cabin, "tailored" to fit Lindbergh, had been made as small as possible. Only two inches of space remained above his head when he was seated, with a few inches to spare at each of his elbows. The main fuel tank was undercut to leave space for his long legs to reach the rudder controls. It was a ship built for this one man and for one particular job.

Fuselage and wings were assembled on the salt flats at Ryan Field, San Diego's only "airport." Then came a final checking up. A "static balance test" must be made to find if the actual center of gravity of the ship was as Hall had figured it. It was. The ship was right. On the next day, the afternoon of April 27, 1927, it was wheeled from the hangar at Ryan Field.

Sixty days had been the time set, and on the fifty-ninth day day the job was done. Lindbergh had said that the plane should be called *Spirit of St. Louis,* and this name had been painted on the sides. So it was no longer the NYP, nor even the N-X-211, that stood there waiting, all glistening new. It was the *Spirit of St. Louis* into which

Charles Lindbergh stepped when the engine had been warmed up. He tested the controls and opened the throttle. Taxiing slowly down the field, the ship gathered speed. Another moment, another fifty feet, and the *Spirit of St. Louis* had lifted its untried wings into the air.

Thus a new "first" in aviation was added to San Diego's history. Yet there were not many to watch. Even when Lindbergh took off a few days later from Rockwell Field on the beginning of his long flight, only a small group of people gathered to wish him luck. To San Diegans he was just Charles Lindbergh, a young flier who believed he could fly alone from New York to Paris. At North Island he took the heavily loaded plane down the field on a long run, then lifted it, circled, and was gone. His disappearing plane became only a tiny speck of silver that grew small and faded into the lavender mountains.

San Diego, through Mahoney and Hall and all the loyal workers who had helped build the plane, had done its part. Success or failure now depended upon just one man.

Lindbergh flew to St. Louis, then on to New York, and there he prepared for the start.

Others, planning the same flight, were almost ready, too. Like Lindbergh, they waited until weather conditions were right for the attempt. The others received most of the attention. They were the ones, the public believed, who would probably succeed. Then Lindbergh, in his San Diego-built plane, took the air.

He sailed off into the sky. New England saw him pass, and Newfoundland. After that he was over the ocean, out of sight of land—gone!

In San Diego, as in all the United States, men and women followed him in their minds. For two days the young aviator, on his lonely, dangerous trip, was in nearly everyone's thoughts. Then clattering newspaper presses in every city, shouting newsboys, and black headlines proclaimed that Lindbergh had landed in Paris.

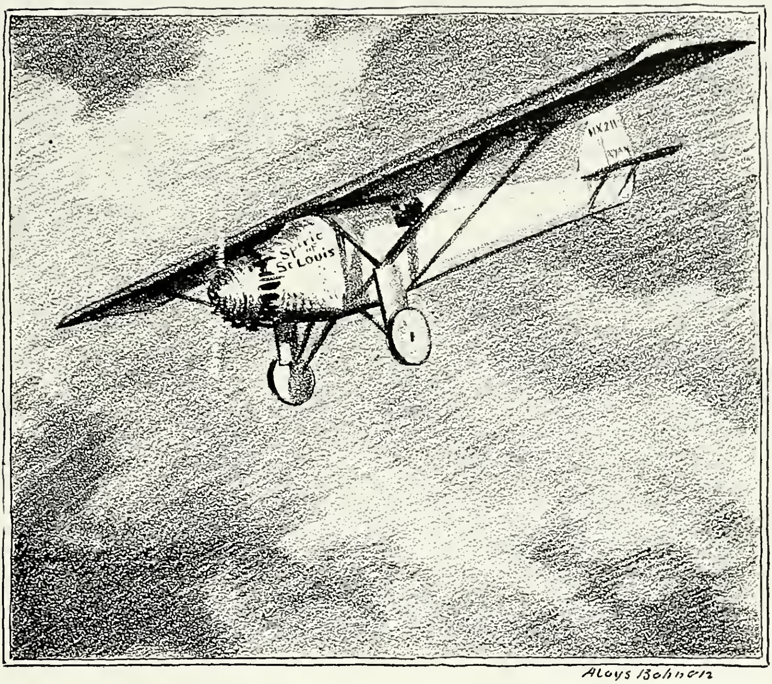
He had won. He had done what no man had ever done before. And he turned aviation topsy-turvy by doing it.

Chapter Eight

THE GREAT BOOM

THE *Spirit of St. Louis* had been built in San Diego. This, back in 1927, was flashed to all the world, and San Diego was not slow to take advantage of the publicity that came with Lindbergh's success. Mahoney, the builder, put his factory into production to turn out planes of a new design resembling the *Spirit of St. Louis* and advertised as "sister ships" to the famous plane.

Ryan himself had had no part in the building of the *Spirit of St. Louis*, having previously sold out to Mahoney. But since Mahoney's company still bore Ryan's name, Ryan came in for a share of the world-wide publicity. He attempted to re-establish himself in the airplane business in San Diego,



Spirit of St. Louis
It was built in San Diego

using the name he had sold, but he was stopped for a time by legal process. Eventually he did come back, however, this time with an aviation school.

Another company, the Solar Aircraft Company, had been organized some time before to develop a plane. Though Solar did build one or two planes, the venture was not a commercial success. Nevertheless the business continued and later successfully entered the manufacture of airplane parts.

But what San Diego needed more than anything else was a suitable landing field. The city's only commercial field was the old Ryan Field on the salt flats opposite the Marine Base. If San Diego was to be worthy of the name "The Air Capitol of the West," given it by the Chamber of Commerce, it must have something much better than Ryan Field.

This problem of a field had been considered by the Aviation Committee of the Chamber of Commerce. In January, 1925, when the committee was organized, the need for a field was seen. At that time several locations were proposed, including a tract of dreary mud flats bordering the bay. This site, it was pointed out, was closest to the downtown section, to the post office, and to the railroad. It was near a streetcar line. And to the north of the site lay a shallow body of water not used by ships but suitable for seaplanes.

In spite of these advantages and the need for a field, no action was taken until after Lindbergh flew his little plane to Paris. Then it was possible to float a $600,000 bond issue on the tide of the Lindbergh publicity. Old wharves and a sewer pipe bordering the flat were cleared away. Soil was dredged from the bottom of the bay and pumped out over the field, filling it above the maximum high-tide level. Hangars and an administration building were constructed, a runway was paved, and Lindbergh Field was the result.

The field was added to later. More dredging was done, and the level ground was extended farther out into the bay. New buildings were erected, and ramps for seaplane use were installed.

While Lindbergh Field was taking form,

Mahoney moved his factory to St. Louis, and a short time later sold out. Ryan remained in San Diego. The same progressive spirit that had developed his one-man-and-a-plane outfit into something substantial took him to the new Lindbergh Field, where he obtained modern buildings and a hangar.

Construction of Lindbergh Field soon brought further aeronautical developments. All over the country, airports were being established. Commercial airlines, for which the United States had waited so long, were being formed. Ryan and Mahoney years before had pioneered in scheduled passenger service. The government-operated air mail had proved that long-distance transportation was practical. Now passenger carrying on a large scale was to begin, and San Diego was "on the map."

In the great automobile city of Detroit, the big Ford factory had been manufacturing automobiles by the millions. There an aeronautical engineer, William B. Stout, was experimenting with all-metal airplanes. Stout interested the Fords in aviation, and sold his patents to the Ford Company. The result was the big tri-motored all-metal Ford plane.

San Diego saw those planes for the first time November 15, 1927, when the Maddux Airlines began operations. The Maddux Lines ran between Los Angeles, San Diego, and Agua Caliente. Many of its passengers were patrons of the Agua Caliente race track and hotel. Planes were also operated to Ensenada for a time, and later the Maddux Lines were extended to San Francisco and to Phoenix, Arizona. During the first eight months the Maddux Airlines carried fifteen thousand passengers. Here was real air transportation at last.

Greater things were on the way now that the big boom in aviation was on. Transcontinental airlines were established. In July of 1930 two branches of these lines reached San Diego. United Airlines offered air-mail and passenger service between San Diego and Seattle. Two weeks later Western Air Express began mail and passenger service between San Diego and Salt Lake City. These lines connected with American Airlines, TWA, and others. Both companies used hangars at Lindbergh Field, and the San Diego terminal became part of a great nation-wide system.

In San Diego, a few years before, there had been only Ryan and one or two others taking passengers for "joy rides." Now a passenger could buy his ticket for New York or almost any other large city in the country. Air travel was an established fact.

Meanwhile other flying was seen. In this city where so many records had been established, additional records were being made. Lindbergh had set the style for "good will" flights, and a Mexican army officer, Captain Emilio Carranza, followed his lead. Captain Carranza, in May, 1928, made the first nonstop flight from San Diego to Mexico City.

Another San Diego performance started a fad lasting for several years. On December 30, 1928, the Army's tri-motored Fokker, Question Mark, rose from Rockwell Field, and was refueled in the air. Two days later it went aloft again. Then for a hundred and fifty hours, forty minutes and fifteen seconds it stayed in the air. Through days and nights it circled above the city, being refueled from time to time. When it came down, a new world endurance record had been set. Other endurance flights followed at many different points, until planes were staying in the air for more than a month. But the Question Mark had shown the way and had written another "first" into San Diego's history.

There were other developments here, too. Airtech was established at Lindbergh Field to give expert service and repairs to airplanes. James Russell organized the Russell-Lobe Parachute Company, manufacturing "chutes" which were widely used.

San Diego also saw the start of a flight which established a unique aviation "first." Frank Hawkes left Lindbergh Field in a glider. The glider was towed by an airplane. In this fashion, Hawkes journeyed by easy stages to Roosevelt Field, New York.

In such ways, through the exploits of individuals, and by the establishment of a factory and a field and passenger-carrying lines, San Diego shared in the great boom, which ended with the business depression that swept most of the civilized world in 1929. Yet, in spite of the depression, aviation progressed. The depression merely slowed it to a more healthy rate of progress and eliminated much of the element of speculation that had come with the boom. Southern California was the bright spot of the country for aviation during the depression, and San Diego, in some ways, was brightest of all.

Chapter Nine

GLIDERS AND DIRIGIBLES

AS aeronautical science developed, San Diego saw aviation in all its phases. Beginning with Glenn Curtiss' little machines, great passenger carriers and fighting planes evolved. With these, San Diego witnessed the development of other methods of air travel. It saw gliders, which were motorless wings, and huge dirigibles, multi-motored but wingless.

San Diego has always had gliders. Long before the first white men saw this shore, gliders were here, sailing above the cliffs of Point Loma, and on up the coast skimming the ocean swells. These were only pelicans and gulls, of course. Yet anyone who has seen them soar and circle and cover long distances with never a movement of their wings knows them for expert gliders. Larger gliders, gliders with men to guide them—motorless airplanes—are more recent.

Perhaps it should be said that successful gliders are more recent, for the idea of gliders is very old. Centuries ago men watched the birds and wondered if man could do as they did. There were experiments. Daring individuals made bat-like wings, which they fastened to their arms and bodies. Then they launched themselves from high places, sometimes with unpleasant results.

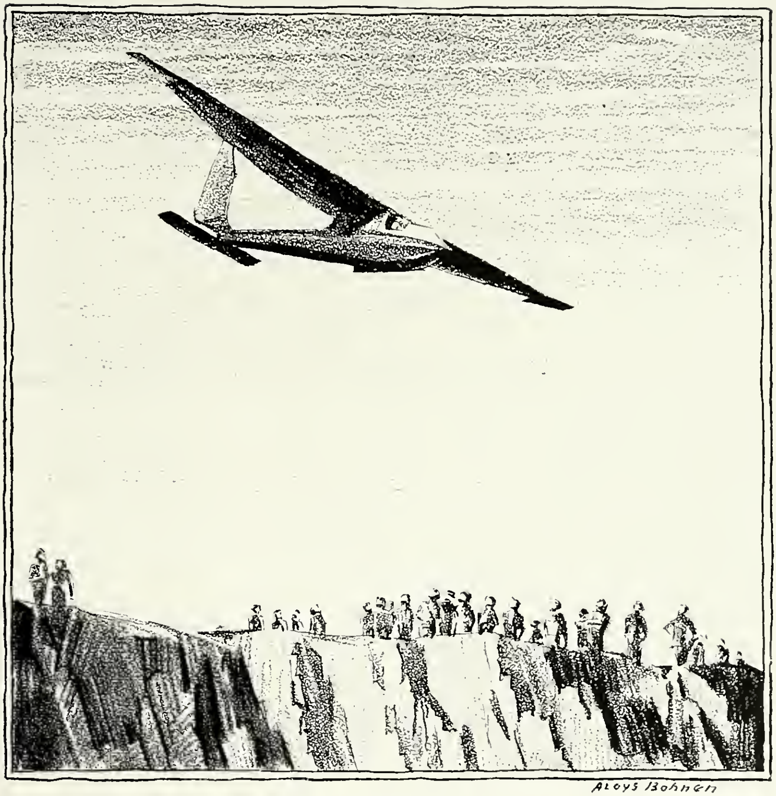
But that was long ago. Now, by a glider is meant a machine with wings of its own, and a place for a man to sit and guide it. The machine has no motor. It sails as the gulls and pelicans sail when they spread their wings wide.

One of the most successful of the early glider experimenters was an American, Octave Chanute. Chanute made a trip to San Diego to study birds and to photograph pelicans, using these studies to improve his gliders. He advised the Wright brothers in their glider experiments before an engine was used to pull a glider through the air. Though Chanute believed that a powered glider would never be feasible, his advice to the Wrights did much to help them develop the first successful airplane.

Montgomery was another of the early glider experimenters who achieved considerable success. One of his performances was to be carried aloft by a balloon, and then to glide back to earth from a height of several thousand feet, performing difficult maneuvers on the way. Montgomery made a visit to San Diego in 1890 and demonstrated his glider at Otay.

Modern glider flying began in Germany. Since the Versailles Treaty discouraged the use of airplanes in Germany after the World War, young Germans flew gliders instead.

The popularity of gliding soon spread beyond Germany. By the end of 1927 a few air-minded young people in the United States were trying their hand at it as a sport. Until the Bowlus sailplane was produced, however, gliders in this country did not compare with those of Germany. The Bowlus sailplane, like so many other things in aviation, began in San Diego.



Sailplane

Jack Barstow went up over Point Loma

Hawley Bowlus was factory manager for the Mahoney Aircraft Company. After the Mahoney Company moved to St. Louis, the Bowlus Sailplane Company was formed. A section of the old Mahoney factory was used, and there Bowlus designed and manufactured an advanced type of glider which he called a sailplane. It was larger and more streamlined than any other glider manufactured in this country. To advertise these sailplanes, Bowlus himself piloted them on frequent flights. Sometimes he would soar for hours over the ridges of Point Loma and Soledad and the cliffs of Del Mar. He added glider records to the many other aviation achievements for San Diego.

In 1930 Jack Barstow went up over Point Loma in a sailplane. He had not set out to make a record, but air conditions were favorable and for hours Barstow's sailplane floated in the air. Time after time he descended almost to the ground, only to rise again over the ridges and cliffs as he maneuvered the sailplane into an ascending air current. Night came, and still he was cruising back and forth. Down below him the lights of automobiles, where people had gathered to watch him, illuminated the ground. Now and again he swooped silently, just over the heads of the watching people, and even spoke to them.

When at last Barstow descended, he had established a new glider endurance record of over fourteen hours. This could not be recognized as an official record because instruments necessary to make a record of his flight had not been carried. Nevertheless a prize of $2,000 was presented to Barstow in recognition of what he had done.

The sport of gliding now became almost a fad. The National Glider Association was formed, with authority to issue licenses to glider pilots. A soaring license was difficult to obtain. At one time only nine persons in the United States held these. Six of the nine had been won in San Diego. It was here that Colonel and Mrs. Lindbergh, while visiting the city, qualified for their soaring licenses. Lindbergh's license was number eight, and Mrs. Lindbergh's was number nine.

Even in the schools, gliding was of

interest. A glider club was formed at San Diego High School, and gliders were built. Club members did some actual flying over the Point Loma cliffs.

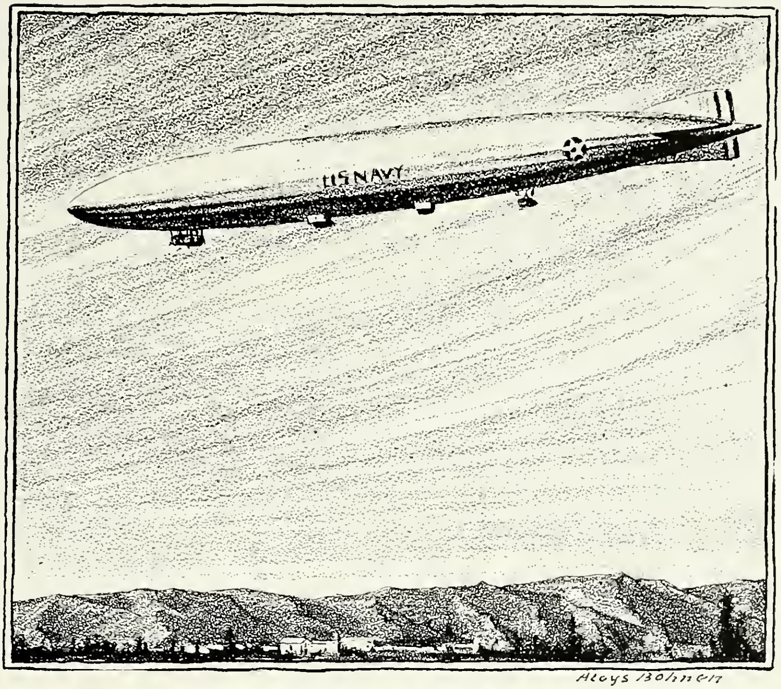
With the help of a Naval Reserve pilot, Lieutenant L. T. Kittredge, this work has been continued. In addition, instruction in motors, aerodynamics, and aircraft rigging is offered in high school courses. As a result, San Diego schools are among the foremost of the world in this respect.

San Diego saw lighter-than-air craft, too. Dirigibles appeared over the city from time to time. A tire and rubber company sent a small blimp, or nonrigid ship, at intervals. Larger, rigid-type naval ships also crossed San Diego's sky. The dirigible *Shenandoah* was moored at one time at North Island. Later the *Akron* sailed above the city and moved on toward Kearney Mesa, where a mooring mast had been erected.

Tragedy came when the big ship was about to be drawn down to the mast. Lifted in a sudden gust, the ship took three sailors of the ground crew into the air. Two dropped and were killed, but the third managed to lash himself securely with the ropes, clinging to them for hours before being hauled inside the airship.

The *Akron*, like the *Shenandoah*, later met with disaster and took its crew down to death, only to be followed by the giant *Macon*, which was destroyed out over the waters of the Pacific.

Aside from one German ship, no more big dirigibles were seen. Gliders, too, became more rare. These phases of aviation, although interesting in themselves, did not assume commercial importance here. San Diego's chief aeronautical interest lay, as before, in the development of planes.



Lighter-than-air

The Akron sailed above the city

Chapter Ten

SAN DIEGO BUILDS PLANES

THE city that has watched so many planes in flight has now turned to manufacturing them. Today, in 1938, one of the largest airplane factories in the world stands near San Diego Bay. An industry is developing for which the city is especially adapted.

San Diego has long had airplane building of a sort. In the early days it was a queer sort, too. Barn factories those first ones might have been called, although sometimes the builders did not even have a barn.

About 1912, for example, a certain Mr. Tolliver and his wife were building an airship. It was not an airplane, but a dirigible, a lighter-than-air ship embodying new principles. Instead of having movable rudders and elevators for control, the angle of attack of the propellers was adjustable. On a vacant lot near 30th and Broadway, the Tollivers constructed the two hundred-foot long rigid framework of bamboo. Handbills were circulated, advertising that Tolliver's airship would operate on a schedule over a route between San Diego and Los Angeles. Before the first flight was made, the deaths of Mr. Tolliver and his wife put a stop to the experiment. San Diego's first and only "dirigible factory" was closed.

None of the barn factories developed into successful businesses, either. It was Ryan who became San Diego's first real airplane manufacturer, though on a small scale.

Later, following Lindbergh's flight, Ryan again began to build planes. At the present time the Ryan factory is manufacturing light sport planes at Lindbergh Field. San Diego, however, did not become a real manufacturing center for planes until the Consolidated factory was built.

The Consolidated Aircraft Corporation, a few years ago, operated a large factory at Buffalo, New York. There sport and training planes as well as flying boats for the Navy were manufactured. Managers of the Consolidated, like Glenn Curtiss many years before, were looking for a new site. Like Curtiss, they wanted sunshine and clear skies, and they wanted a place where storms and high winds were not common and where experimental flying could be carried on the year around.

The Chamber of Commerce and the harbor department convinced them that San Diego was that place. The company decided to move here, and the factory that now stands at Lindbergh Field is the result.

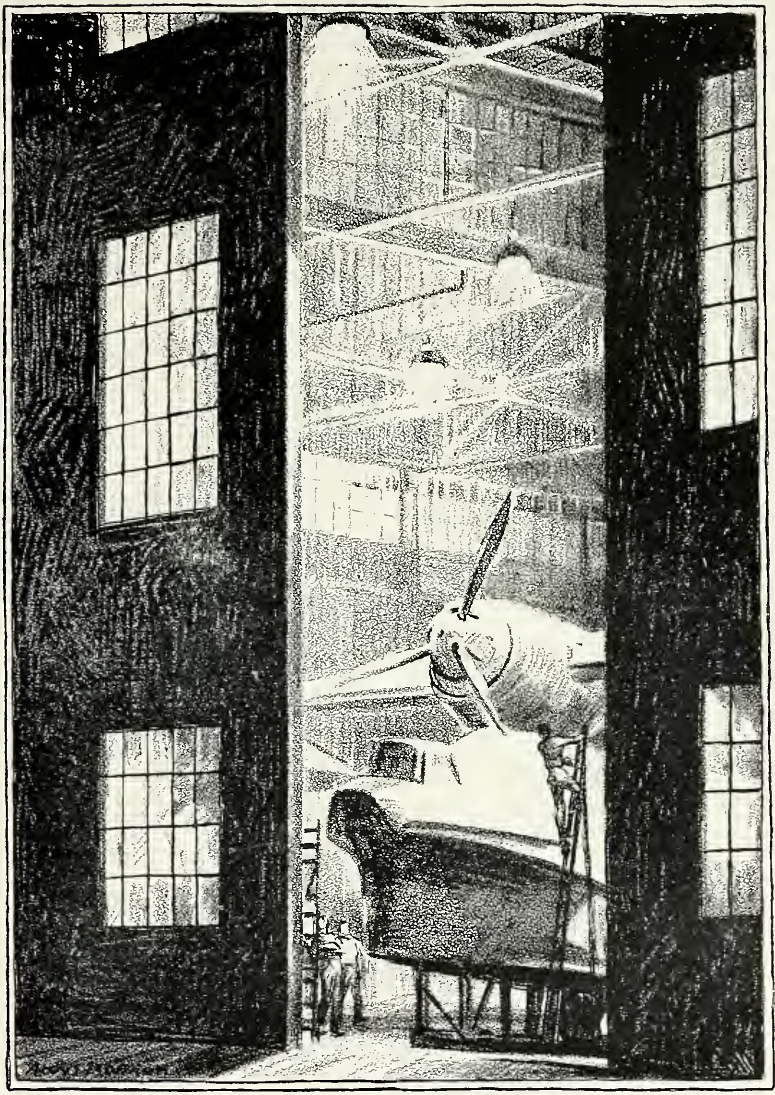
The great Consolidated factory is modern in every respect. It is second in size only to the Douglas factory at Santa Monica, California. Even so, this great San Diego plant has already proved too small to take care of an increasing volume of business.

The original factory, which the Consolidated built in 1935, had some 250,000 square feet of floor space. An addition was built, providing another 185,000 square feet, giving a total of 432,000 square feet or about the area of five city blocks. It is this enormous plant which has become the birthplace of the Navy's "big boats."

Nearly all of Consolidated's work at the San Diego factory has been done for the Navy. The factory has built fifty Army pursuit-bombers and six large flying boats for the Argentine government. Aside from this, the output of this plant has been and still is an important factor in the creation of the Navy's new flying force.

Like other modern planes, these Consolidated ships are made of metal and are very different from the planes of a few years ago. Those first planes were made of wood or bamboo and cloth, and the wonder was that they hung together at all. Later came substantial wood construction, with fuselage and wings made from thousands of pieces of wood glued together and braced with wires. Finally metal came into use, and the whole business of plane building was revolutionized.

New alloys made this possible, alloys of aluminum and of magnesium, which are very light yet strong. Now the different parts of a plane, riveted together, are trussed



At the Factory
Consolidated ships are of metal

into frameworks stronger than any made from wood.

This work calls for skilled labor, and the manufacture of airplanes is no longer a simple matter of a half-dozen men working together to build a complete plane. Quantity production of airplanes has become very much like quantity production of automobiles. About 3,000 men are employed at the Consolidated factory, but no one man makes a plane, any more than one man makes an automobile. Each has his own work to do, and he does the same thing day after day.

Much of the romance of airplane building is gone, as far as the individual workman is concerned. Yet there are still romance and the thrill of achievement for those who plan new methods and design new planes. The task is unending. Each year, almost each day, sees something new and better in aircraft equipment or design. Ever-increasing progress is indicative of continued future growth.

Chapter Eleven

SEA EAGLES

THE United State Navy has grown wings. Feeble at first, they have become stronger year by year. San Diego, watching the aerial navy develop, has seen aircraft both new and odd, perhaps the oddest of all being "the covered wagon," the first United States aircraft carrier, *Langley*.

The *Langley* originally was a collier, carrying coal and other supplies. In 1922 it was rebuilt. Having stripped off its superstructure, the naval designers had a landing platform constructed. For the first time in the history of American aviation, a landing field could be sent to sea. The early experiments of Curtiss and Ely had grown into something very practical and business-like.

The carrier was named in honor of Professor Langley, who had conducted early experiments on the Potomac River. Airplanes were placed on board, and the carrier was sent to San Diego, which became its home port.

The *Langley* was an experiment, which was successful from the first. The carrier is still in commission. With a capacity of fifty-four airplanes, it carries about twelve during peacetime. The planes land and take off from the big deck almost as they would on a flying field.

The ship carries land planes, not seaplanes. They are not equipped to alight upon the water, but land directly on the deck, doing on a larger scale the same thing that Curtiss and Eugene Ely proved could be done long before the World War.

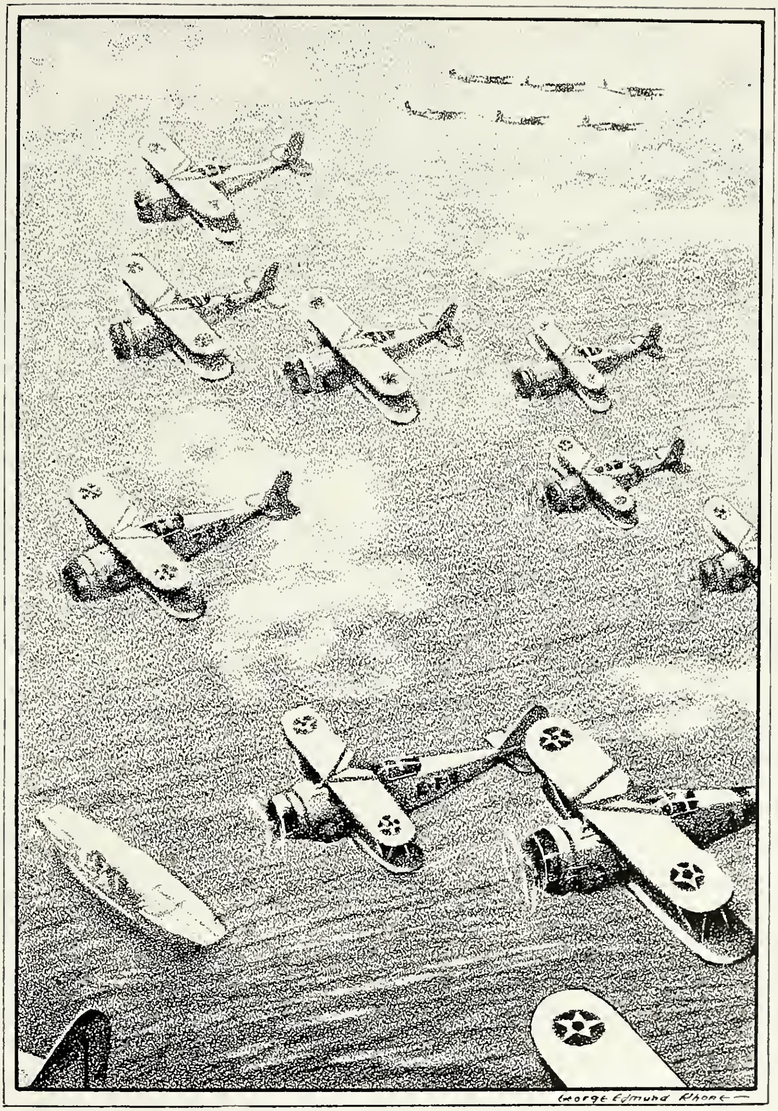
Yet the deck of a ship, even when it is made as large as possible, is a small landing field for an airplane to touch on and come to rest. It is a small field to take off from, too, and so holding and arresting devices have been invented.

When a plane is to take off from the

Langley's platform, it is held back at first by a mechanical device. The engine thunders. The propeller bites into the air until the plane is straining to get away. Released suddenly, the plane starts off like a shot. It roars down the deck. Before it reaches the end of the runway, flying speed has been gained. The plane lifts, then swoops skyward under complete control.

In landing, another mechanical device catches the plane as it rolls swiftly down the platform, and checks its speed. The operation of this checking device is a Navy secret. It works. That is all that is known.

Following the *Langley's* success, other aircraft carriers were built. These were no made-over colliers but great ships designed for the purpose of carrying planes. Three of them, the *Saratoga,* the *Lexington,* and the *Ranger,* are now in commission, each with a capacity for about one hundred airplanes and with landing decks as long as three city blocks. These, too, San Diego has seen anchored in the Coronado Roads, with their swift little planes, like buzzing hornets, taking off the big decks or landing on them.



Naval Aviation
The ship carries land planes

Other ships besides aircraft carriers carry airplanes. Battleships and cruisers, which so often lie at anchor in San Diego Bay, have airplanes of their own. These are fastened in racks on the decks, ready for instant use. They are not land planes, such as the aircraft carriers have, but are equipped with floats.

Usually these planes are launched from catapults. Centuries ago men built "engines of war" called catapults, which were used to hurl huge stones against an enemy. These modern catapults are very different. Instead of the spring and whip of bent poles, these operate by compressed air, launching an airplane from the deck out into the air.

Sometimes the planes are lowered into the water by crane, where they take off under their own power. But whether their flight begins this way or by the quick throw of a catapult, they alight on the water when they return. Taxiing alongside the ship, they are hoisted back aboard, an operation remindful of Glenn Curtiss' early flight. With the first seaplane ever built Curtiss proved that this could be done.

San Diego, the birthplace of seaplanes, witnessed a tremendous growth of the naval flying field at North Island, where naval aviation "came ashore." Here one of the largest naval fields in the country was developed. Rockwell Field, which belonged to the Army, was once all there was at North Island, but naval activities grew to such an extent that the Army forces were moved farther north, and the Navy took over the field.

Rockwell Field had been an important point. From the entry of this country into the World War, Army flying was a substantial part of the aerial activities of San Diego. Great Martin bombers, in later years, were seen roaring through the sky. Other planes towing targets were followed by fast Army pursuit planes. Sometimes, from one of the bombers cadet fliers would leap, one by one. Their parachutes opened like white blossoms and dropped the fliers gently down to earth.

The Army encouraged the establishment of state National Guard units, too. One of these, the 514th Observation Squadron, was organized in San Diego in 1922. The squadron's planes were furnished by the Army and were based later at Lindbergh Field.

But, despite all its military flying, San Diego has been primarily a "Navy town," and naval developments have forced Army flying to other fields. An Army supply depot is still maintained at North Island. Nevertheless, only naval fliers keep in training there and carry on bombing and battle practice.

These naval fliers from the North Island field are perhaps as skillful a group of aviators as can be found anywhere in the world. They must know how to fly all types of aircraft, big flying boats, amphibians, seaplanes, and fast little scouts. They must know how to take off from a catapult on the deck of a cruiser and how to land on the deck of an aircraft carrier. They must know how to fly anything, anywhere, at any time.

Above all they must be navigators, actual seamen of the air. Flying over the ocean far out of sight of land, they must know how to return or how to find the fleet whose position comes to them by radio. In addition to this they must be radio engineers.

All this naval flying San Diego sees as a matter of daily routine. It all takes place in the clear sky where Glenn Curtiss came not so long ago looking for sunshine and a body of calm water where he could prove what he knew must be true. He proved it. He showed that the airplane could and should be used in connection with the fleet. Now, where Curtiss' lone plane flew, squadrons of sea eagles pass by night and day. United States naval aviation, which had its beginning on San Diego Bay, is not surpassed in any other country of the world.

Chapter Twelve

GUARDIANS OF THE COAST

THE Coast Guard has taken to the air. The danger zone where land and sea are joined is now guarded in a new way.

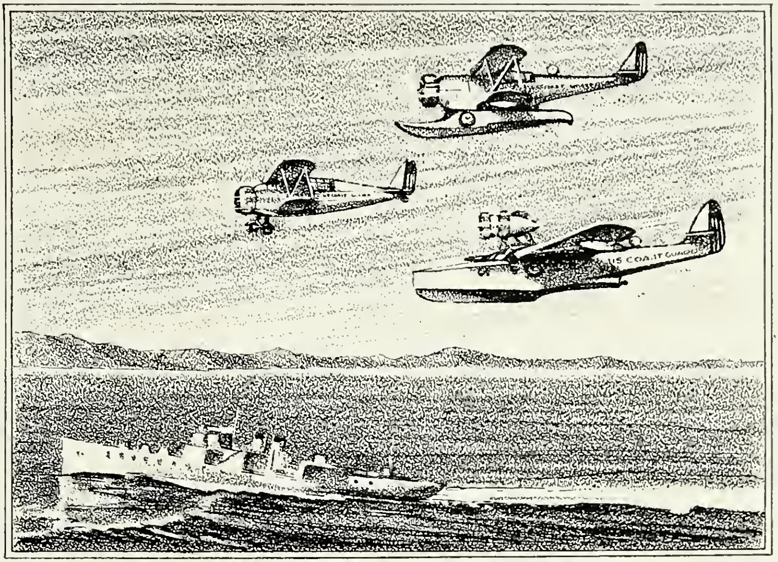
Since men first went to sea, the coast has been dangerous. For nearly one hundred and fifty years the United States coast line has been patrolled. Men on shore and others on fast cutters have stood guard. Today the coast still has its dangers, but now the Coast Guardsmen soar above their "beat." Patrolling at one hundred and fifty miles an hour, they scan both land and sea.

San Diego's Coast Guard Station was established at Lindbergh Field in 1934. In 1937 a new station was built just below Lindbergh Field, to which the Coast Guard force was moved. Six planes are now operated from the station. Pilots, mechanics, radio operators, and other men of the service are always on duty.

The men of the San Diego Station are doing fine work. Here, for example, is an incident taken from the station records, something which Coast Guardsmen consider just "part of the day's work"—

Two o'clock had just struck on an afternoon of March, 1936, and the radio operator at the United States Coast Guard Air Station at Lindbergh Field sat idle with his earphones clamped to his head. It had been a dull day. Not much had happened. But suddenly he jerked erect as sound crackled faintly in his ears. He reached for a pencil and wrote words which he made from the dots and dashes the radio was picking up.

Far away across three hundred and seventy-five miles of Pacific Ocean the tuna ship, *City of San Diego*, was lifting to the waves, while down below in his bunk, rising and falling with each heavy sea, the ship's engineer lay sick, dying perhaps. Up in the radio



Off on Patrol

The Coast Guard has taken to the air

room of the fishing ship a man sat at his key sending a call. Could the Coast Guard help? Could they get this man to a hospital quickly? That was the message being received at Lindbergh Field.

Not far off Point Loma, the Coast Guard's new cutter *Calypso* was patrolling. The *Calypso* heard the call, and immediately put about, heading south. The cutter was new and fast, and in a little over forty hours would have the sick man back in San Diego in a hospital. But to the men in the air station at Lindbergh Field even the speedy *Calypso* seemed slow.

Forty hours? A man that ill might not live forty hours. "Ask that tuna ship about the weather and the sea."

The answer came back, "Weather gusty, sea choppy."

By that time charts had been spread on a table, and the tuna ship's position marked. Another message went out. "*City of San Diego*, head for South Bay, Cedros Island. Coast Guard plane will pick up your man before dark and have him back tonight."

Out on the field the big twin-motored

Douglas Dolphin was ready and serviced. It was an amphibian, able to alight on either land or water. Its full tanks held enough gasoline and oil to carry it seven hundred miles.

The plane's radio operator seated himself at the controls and began warming up the motors. Behind him a mechanic was swiftly stowing away emergency equipment. The pilot ran out on the field and climbed through the hatchway. Rolling forward, the amphibian turned into the wind. Then, with motors roaring, it took its run and swept into the air.

From the ground the crew of a Boeing transport waved. Coast Guardsmen stood about, watching. All of them knew the danger the plane and her men would be flying into. The amphibian, with fuel for only seven hundred miles of normal flight, was starting on a round trip of six hundred and fifty miles. Head winds would almost surely increase gasoline consumption.

In the plane, the men settled to their tasks. They flew southward, following the coast, then out toward the open sea, while the radio operator checked their position from radio stations on shore. The cutter *Calypso*, ploughing through the choppy sea, was passed and left behind. After that the big Douglas drove on alone.

Soon the radioman was in touch with the tuna ship, which was still twenty miles south of Cedros Island. The open sea was too rough for a landing; so the tuna ship was instructed to proceed to Cedros Island. There on the calmer water in the lee of the island, the Coast Guard plane landed and waited.

Two hours later the tuna ship had reached the island. A small boat brought the sick engineer across to the amphibian. He was safely lowered through the hatchway of the plane and placed on a stretcher bunk inside.

Night was coming on as the return journey began. Clouds gathered. The sky became overcast. Soon the pilot was flying blind, depending upon his instruments to guide him.

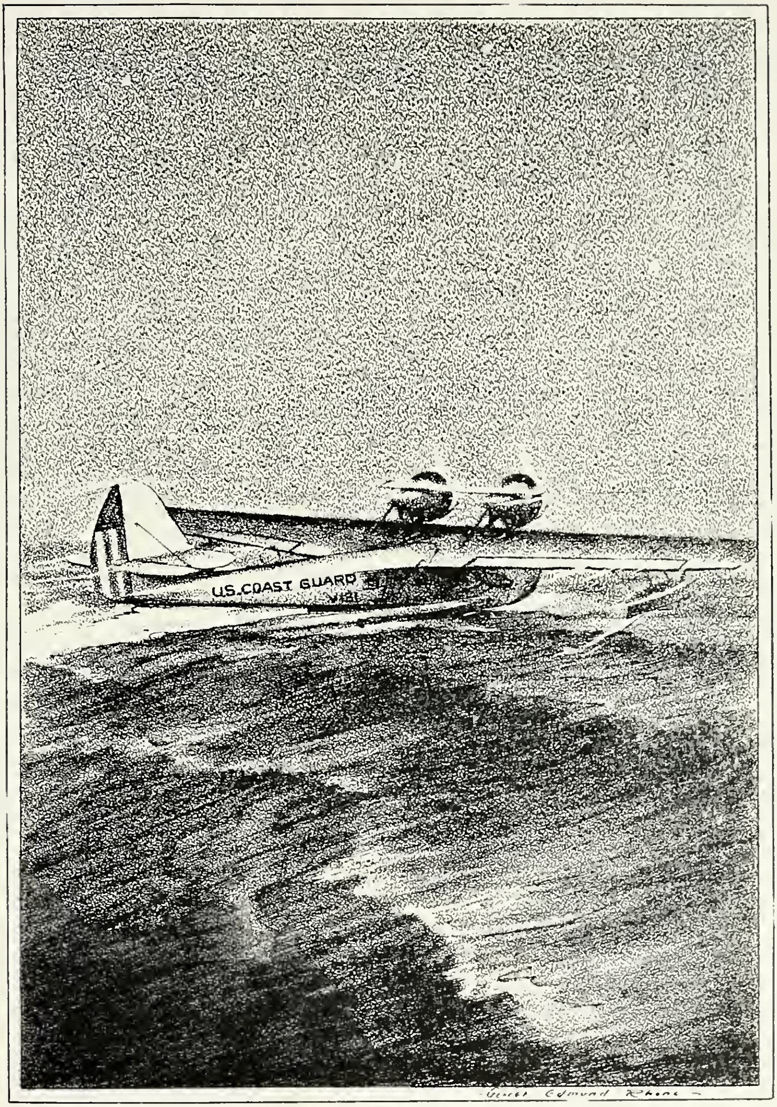
A head wind was rapidly reducing the gasoline supply. The gauges were dropping steadily. Then for a few minutes even the gasoline shortage was forgotten, as the radioman in the amphibian turned from his instruments. He leaped to his feet and dashed aft. There, at the edge of the open hatchway, the sick engineer was about to throw himself through.

The man was delirious, with no idea of where he was. He knew nothing of the eight thousand feet of emptiness that lay between plane and ocean. In his delirium he imagined that his engines needed him, and he must go below.

He almost leaped clear, before the radioman caught him by a leg. A mechanic came and helped, and the two got the man into his bunk. They held him there while the plane roared on.

At last the beacon on Mount San Miguel beckoned them home, but the city was entirely obscured by fog. A ceiling of three hundred feet was reported. Driving through the gray smother, the pilot took the plane in on the radio beam.

By that time the gauges registered almost empty. The pilot did not try to reach the field, but landed in the bay and headed for



Saving Life, Not Destroying It

The return journey began

the Navy ramps at North Island. An ambulance was waiting there; the sick man was soon under medical care, and the Coast Guard's work was done.

Here is aviation at its very best, saving life, not destroying it as in war. It is an old story for the Coast Guard, this saving of lives at sea. Aviation, however, now provides new machines with which to work.

Coast Guard planes patrol the coast, working in connection with the Coast Guard cutters whenever possible, maintaining radio contact with cutters and shore stations, and watching for wrecks and derelicts. Besides this, they aid the Border Patrol and Customs and Immigration officers in enforcing federal laws. Coast Guard planes have even alighted on the water to capture a smuggling boat. The plane's machine guns held the boat at bay until a cutter could arrive and take it in charge.

One of the most important aerial activities is the searching for lost and overdue boats. Coast Guard planes also make rescues from capsized boats. They rescue bathers swept out to sea where lifeguards can not find them. In addition to these many services, they also assist the Forestry Service by locating fires. The Bureau of Fisheries, too, is aided by the Coast Guard planes which make surveys for fish schools.

The Coast Guard, the newest of air services, is under the Treasury Department. In time of war it becomes part of the Navy, but ordinarily it is separate from both Army and Navy. Like theirs, its development is a continuing part of San Diego's aviation history.

Chapter Thirteen

AIRBOATS

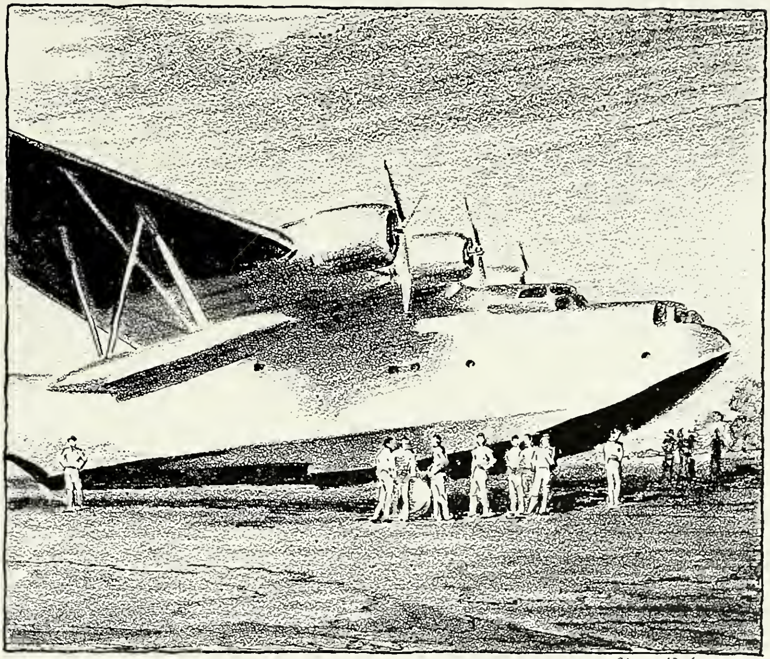
FROM the time of those first Wright and Curtiss planes up to the present, San Diego has watched aviation grow. It saw the airplane take to the water and become the first "hydro-aeroplane." It saw the float underneath the plane change and become a boat. That boat, so small at first, has grown into the airboats of today. The modern flying boats, in turn, indicate something of the huge aircraft the future may have in store.

Looking into the future is never easy, and trying to peer too far ahead is futile. Dreams of monster ships or of rocket planes can be fascinating and may some day become realities, but at present they are only dreams. One can, however, look a little way ahead and judge what San Diego will see in the future by what is now being done.

Considering the PBY-1, for example, one finds that these ships have been built in quantities, and the Navy is already using them. They are no dreams, but actual aircraft seen every day flying over the bay.

In the first place, it is seen that they are real boats. Ships perhaps would be a better name for them, for the word boat seems somehow to refer to smaller craft. Their hulls are about as long as the large San Diego tuna ships, and tuna ships can weather the worst buffeting the stormy Gulf of Tehuantepec can give. Yet the Navy's patrol planes can travel as far in a day as the fishing craft go in a week.

Imagine a hull as long as a tuna ship, with great wings attached to it, cruising high above the sea at one hundred and twenty miles an hour or faster. That suggests what these patrol planes are like. But though they may be as long as a tuna ship, they are not nearly so heavy. A Navy patrol plane weighs about twenty tons, approximately as much as twenty automobiles. A tuna ship



Pan American Clipper
Flying boats have been adopted

with its massive engines and refrigerating equipment weighs about two hundred tons, as much as ten patrol planes.

Standing at the break of a ramp, ready to roll down into the water, one of these patrol planes raises its blunt nose to twice the height of a man's head. The great wings have a span of over a hundred feet, which is the length of six or eight automobiles standing end to end. The wings are enormous, heavy, solid looking. There is nothing flimsy about such craft. They are sturdy ships, able to land on the ocean in almost any kind of weather and get off again. They are real ships, ships of the sea and of the air as well. They indicate what San Diego will see in the next few years.

These big boats of the Navy have already shown the fleet new possibilities. Small airplanes, such as those the big aircraft carriers transport, are fast little fighters, useful in repelling an attack, in limited scouting, or in laying smoke screens; but they cannot carry much fuel. Such planes cannot fly far from their base or from their mother ship. A radius of about two hundred miles is their limit. If they start out from land—from North Island, for instance—they cannot go far out to sea. The airboats, however, are different.

Leaving land, these big ships can fly nearly a thousand miles and still have enough gasoline left to return. They can cruise for long distances, scouting over a wide area of ocean. Having located an enemy fleet, they could attack with bombs before the surface craft could get anywhere near. It seems that they are developing into an entirely new "attacking force" for naval use.

But they must have a home port. San Diego Bay offers safe anchorage. Usually they are driven up to the concrete ramps at North Island. Then, with wheels placed beneath them, they roll on up and stand safely on land. This is how the patrol planes, those great fighting scouts of the Navy, come home when their long flights are done.

In more peaceful ways the big ships are making new records steadily. Flying boats have been adopted by commercial companies as well as by the Navy. Yet even here the

Navy should have credit for much that has been accomplished.

Off the eastern coast, flying southward to South America, the Pan American Airways has been using large flying boats. They have maintained regular passenger routes and have been very successful. Navy training of pilots and navigators, however, has helped to bring about that success.

Pan American "clippers" are also flying the Pacific. These ships are operated regularly between San Francisco Bay and Hawaii, and on to Guam and the Philippines. If plans work out successfully, the line will be extended to China, spanning the entire ocean. Off the eastern coast, Pan American, in conjunction with Imperial Airways, a British company, is operating a scheduled service across the north Atlantic.

Pan American's transpacific ships have landed at San Diego, but do not operate from here. Yet no great imagination is needed to envision a future when such ships may leave San Diego on transpacific flights. The distance from here to Hawaii is about two hundred miles farther than from

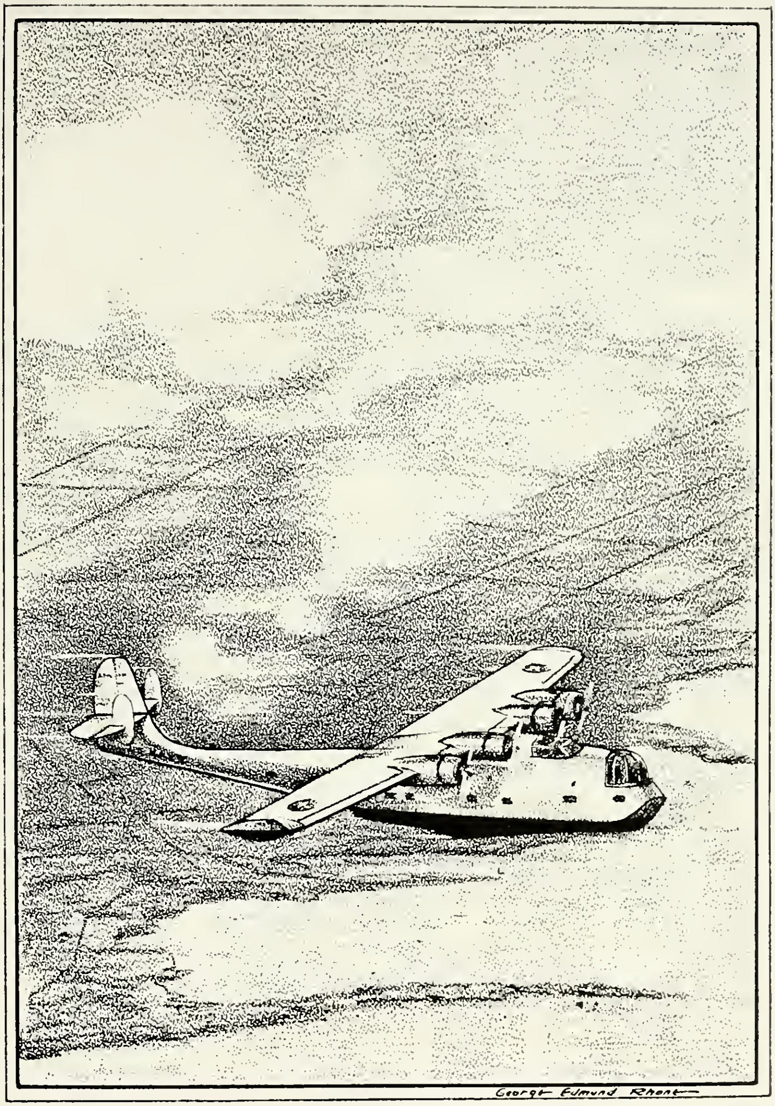
Alameda, but with larger ships it seems reasonable to suppose that those miles will not be too important.

And larger ships will come.

The PBY-1 broke all world records for distance in October, 1935, when it flew nonstop from Coco Solo, in Panama Canal Zone, to Alameda. The distance is 3,450 statute miles. Sixty of those flying boats were built for the Navy at the Consolidated factory.

Larger ships have been built by Consolidated since then, the largest being a huge, four-motored craft. Still others have been built abroad. These are of various sizes, even up to seventy tons as compared with twenty tons for the PBY's. The Do-X, of which much was heard a few years ago, is an example. This twelve-engined monster, like the others, was an experiment. Nevertheless, from such experiments still larger flying ships will come.

Land planes, also, have grown larger, as is shown by the big liners that arrive and leave several times daily at Lindbergh Field. Army planes, too, have grown. Boeing



Consolidated XPB2Y-1
Larger ships will come

bombers, built for the Army, already have reached a size of twenty tons. They have four engines of seven hundred and fifty horsepower each and cruise at about two hundred miles per hour.

Probably these land planes will continue to increase in size, though not so rapidly as the flying boats. With such rapid change of design on both land and sea, there is little doubt that the terminal at Lindbergh Field will have giants of the air swooping down in the years to come. That much of the future may be clearly seen.

Meanwhile radio has been developed until now a ship can fly through storm and darkness, "riding a beam" that guides it to its port. The radio beacon at Lindbergh Field is a part of this system. Invisible by day or night, it sends its message through sunshine or fog or storm, and a pilot, "riding" it, knows if his ship wanders either to right or left.

Better beacons will come. Already a pilot has flown a plane enclosed so that he could not see outside the cabin. Flying "blind," he went up in the air, flew for a time, then came back and landed. His instruments guided him, and a new kind of radio device took him safely down to earth.

Better airplanes will come, too, and still bigger and better ships, which will cross oceans impassable by air only a matter of months ago. Weather reports will chart the course of storms. This, as a matter of fact, is being done now.

As a part of this meteorological development, a curious airplane flight is made at North Island every day. A Navy flier goes up to ten thousand feet, and instruments in his plane make records of wind and weather conditions all the way up. This work is being done by the Navy, but reports are supplied to the United States Department of Agriculture, at the Department's meteorological office at Lindbergh Field. Here weather reports are furnished to pilots, so that no matter where they go, they may know the sort of weather into which they are flying.

Whatever the future holds, San Diego will see. For San Diego is a natural harbor for ships of sea and air. Glenn Curtiss knew it when he came here a few years ago, and the truth is plainer every year. The coming of the Consolidated Aircraft factory is only another indication of San Diego's importance in aviation.

San Diego will see great fleets of the air and will help to build them. It will witness the growth of the airlines into vast passenger- and express-carrying systems beyond anything dreamed of now. In all this the city will have a part.

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